International Abstracts of Surgery

Surgery, Gynecology & Obstetrics

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JUNE 1956

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International Abstracts of Surgery

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VOLUME 102
NUMBER 6

Collective Review

EXPERIMENTAL SURGERY OF HEPATIC CIRRHOSIS

MATHEW W. KOBAK, M.D., Miami, Florida

DURING RECENT YEARS there has been considerable research devoted to the study of hepatic cirrhosis. This has been of particular interest to surgeons in that new methods of treatment, operative in nature, have been proposed for some complications of the disorder. These procedures, however, have not met with universal acceptance and have been essentially limited in scope. At best most of them have been palliative life-saving measures, and they have not been directed at amelioration of the liver disease, this problem remaining entirely within the medical province.

The present review has been developed with the thought in mind that improvement in surgical treatment can be aided by better understanding of the basic liver anatomy and physiology, and the alterations occurring in cirrhosis. Furthermore, it is believed that the evaluation of current and proposed therapeutic techniques can be simplified by such knowledge. From a surgical point of view the disease at present has its chief interest in its effects on the intrahepatic and extrahepatic vasculature and the applications of vascular surgery in its therapy. Therefore this compilation has been oriented to basic liver vascular anatomy and physiology, and the vascular features of the disorder. Material has been presented objectively to afford both a résumé and bibliography to those interested either from a clinical or research laboratory standpoint.

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EMBRYOLOGIC CONSIDERATIONS

Generally the developmental anatomy of the liver bears no relation to the origin or treatment of hepatic cirrhosis. However, recent interest in the possibility of increasing the blood flow to the liver by "arterializing" the portal stream has raised the question as to the ability of the liver to tolerate such a procedure. A partial answer may be suggested by embryologic evidence. As indicated by Elias and Petty (1952), during a period of development a great measure of umbilical blood is diverted past the liver through the ductus venosus, but some passes into the sinusoids of the left lobe. The authors believe this accounts for the comparative large left hepatic lobe seen in fetal livers. The pressure and extent of this arterialized flow to the left lobe cannot be great, for pressures in the umbilical vein of human beings at term range from 22 to 34 millimeters of mercury (Hasselhorst, 1929). The partial arterialization of the left lobe apparently results in no demonstrable cellular changes. Right lobe enlargement in adult life is explained by Melnikoff (1924) by the reversal of the direction of flow in the entire left trunk of the

portal vein after ligature of the umbilical cord. An additional fact of embryologic interest is that the fetal portal system contains valves whereas the adult system does not (Macpherson, 1951).

NORMAL ANATOMIC HEPATIC RELATIONSHIPS

Knowledge of normal and variant intrahepatic and extrahepatic vascular anatomy is fundamental in a surgeon's approach to the problems of cirrhosis, particularly in view of the many applications of vascular surgery to the disease. Historically, liver anatomy has been well established by Glisson (1654), Kiernan (1833), Rex (1888), Mall (1906), Segall (1923), Melnikoff (1924), Hjortsjo (1948), Elias (1949), Fainsinger (1950), and Elias and Petty (1952). These men have utilized a variety of techniques to delineate liver structure, including gross and microscopic appraisal of specimens, perfusion, and injection studies with various media.

Elias (1949, 1951) has graphically described the hepatic mass as consisting of a continuous grouping of liver cells arranged as plates in a "swiss cheese" fashion about spaces called hepatic lacunae. The spaces form hepatic labyrinths, and hepatic lobules are elements of this entire mass surrounding a central vein. The lobulations are bordered by "portal canals" which enclose a branch of the portal vein and hepatic artery, bile ducts, lymphatics, and nerves. Venules penetrate holes in the "portal canal" limiting the membrane cells, and connect axial branches of the portal vein with sinusoids which are suspended in the hepatic lacunae. The latter empty into the central veins and in turn unite with the hepatic veins. Arterial capillaries and arterioles also pass through the periportal limiting plate, uniting branches of the hepatic artery within the portal canal with the liver sinusoids (Fig. 1).

Liver plate arrangement is dependent on both the blood flow and the pressure (Elias and Sokol, 1953). Thus, elevation of the blood pressure in the hepatic veins, or lowering of the portal pressure will center lobulations about the portal canals instead of the central vein. In the pig (Elias *et al.*, 1954) lobulations are permanent and bound by a connective tissue septum. This resembles early subclinical cirrhosis.

The anatomy of the human hepatic artery has been shown in its many variations by Anson (1950), Madden and Lore (1952), and Michels (1953). The intrahepatic ramifications of this vessel have also been elaborated by Elias and Petty (1952) and Healey and Schroy (1953). According to Martens (1920), rich intrahepatic anastomoses exist between the right and left hepatic artery branches, but Flauser (1953) believes these are all extrahepatic and that communications do not occur in the liver. In the case of the dog, a prime experimental animal, the artery gives off 2 to 5 proper hepatic arteries when it reaches the porta of the liver and soon after it reaches the origin of the last branch, it contributes the right gastric and pancreatic branch. The hepatic artery continuing in the lesser omentum terminates in the gastroduodenal artery (Bradley, 1927). According to most laboratory workers, however, the liver branches are regarded as the terminal ends of the hepatic artery. This point has made for confusion in interpreting the results of hepatic artery ligature in the dog. Jefferson *et al.* (1952) in discussing this have indicated that the collateral blood supply to the dog's liver is extensive and variable.

The gross vascular anatomy of the portal system has been studied by Purcell *et al.* (1951) and Madden and Lore (1952), while associated splenic vein anatomy has been analyzed by Gerber *et al.* (1951). According to Elias and Petty (1952) and McIndoe and Councellor (1927), the common portal vein divides upon entering the liver into a right and left trunk, and each trunk supplies its own territory. The dividing plane between the portal areas has further been defined by Hjortsjo (1948), who noted that the right portal volume was larger than the left. Rousselot (1940) and Douglass and Baggenstoss (1950) have called attention to variations in the portal anatomy, and more recently Rousselot *et al.* (1953) have cited the early studies of Wolcker (1922) on this subject.

In the dog the portal vein is derived from two trunks. One results from union of the splenic and gastric veins, and the other from the united cranial and caudal mesenteric veins. Thus formed, the portal vein passes to the porta of the liver. Near the liver it is joined by the gastroduodenal vein and by a pancreatic vessel (Bradley, 1927). Elias and Petty (1952) have further defined the intrahepatic portal circulation in this animal.

Considerable attention has been given to the problem as to whether hepatic arterioportal venous anastomoses occur normally within the hepatic lobule and, if present, whether they are near the lobule center or at the periphery. Betz

(1863) originally found that the portal vein flow affected the hepatic arterial flow in dogs. Gad (1873), conversely, working with rabbits' livers, noted that variations in the hepatic arterial flow affected the portal circuit. The communications between the hepatic artery and the portal vein have been called "valves of Gad." Chrzomszczewsky (1866) performed injection studies and concluded that the hepatic artery was connected with the central portion of the lobule; however, Cohnheim and Litten (1876) raised objections to his experimental method. Further evidence of communication between hepatic arterial and portal venous systems has been supplied by Mall (1906) and, more recently, by Wakim and Mann (1942), Dumais (1944), Knisley *et al.* (1948), and Seneviratne (1949).

From the preceding evidence it appears that both the hepatic artery and portal venous systems supply blood to the liver sinusoid. However, there is a question, based on anatomic grounds, as to the amount of blood supplied to the hepatic substance by the hepatic artery. Mall (1906) injected pigment granules into the hepatic artery and concluded that this vessel particularly supplied branches to the fibrous capsule of Glisson and to the surface of the organ. In addition, branches went to the interlobular regions and to capillary branchings in the lobule.

Elias (1949) is of the opinion that shunts between the portal vein and hepatic vein are not present normally. On the other hand, such shunts have been recorded by Brissaud and Sabourin (1888) and Prinzmetal *et al.* (1948). In the latter study microscopic glass spheres of larger than capillary size were injected into the portal vein and were recovered in the lungs of animals.

The intrahepatic anatomy of the hepatic veins has been described in detail by Elias and Petty (1952). The hepatic veins usually interdigitate with the portal veins, unifying the liver structure in the human being. This does not occur, or is less evident, in multilobated livers of lesser mammals in which the major hepatic veins run parallel to the portal branches (Elias, 1954). Although muscular sphincters are generally thought to be present in the hepatic veins in dogs (Arey and Simmonds, 1920), there is doubt as to their presence in human beings. However, sphincteric action in man probably occurs in contraction of the larger veins at

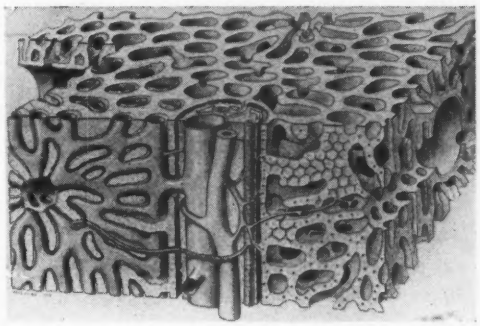

FIG. 1. Stereogram of the normal human liver. (Courtesy of H. Elias and G. D. Searle and Company.)

arborizations of the hepatic venous tree (Elias and Popper, 1955).

The venous drainage of the gastroesophageal junction, important from the standpoint of esophageal varices, has been studied by Kegaries (1934). Injections were made into the coronary vein of the stomach and the specimens examined. Fine capillary anastomoses were found to exist between the portal and caval circuits. In the esophagus the vessels were traced both superficially and deep to the muscularis internis, and the larger channels were found to be poorly supported by loose connective tissue. Below the cardia the coronary vein pierced the serosa and muscularis of the stomach at an angle and then broke up into fine branchings. A periesophageal plexus of veins was not shown, but rather a system of large trunks without cross anastomoses.

According to Waterson (1937) the nerves to the liver are both from vagal branchings and from the celiac plexus of the sympathetics. Those from the sympathetic system are distributed chiefly to the walls of the vessels. These nerves run along the hepatic artery forming the hepatic plexus and finally enter the liver with the blood vessels. Alvarez (1953) believes that in some animals a branch of the vagus nerve passes to the hilus of the liver. He quotes Wen Wang (1953) as having shown in guinea pigs that the nerve endings accompany the blood vessels in the liver and pass to the hepatic cells and to the Kupffer cells.

The course of the lymphatic channels in the liver is not well defined. Waterson (1937) states that in human beings the vessels pass to the surface where they lie below the peritoneum, or they accompany the portal or hepatic veins.

Bollman (1950) attempted retrograde injection of these lymphatics and could only show them back as far as the hepatic lobule level. He was not sure whether the channels connected with the perisinusoidal spaces (Disse), or whether they were blocked here by valve structures such as exist in the extrahepatic lymphatics.

PATHOLOGIC ANATOMY OF CIRRHOSIS AND ITS EFFECT ON THE HEPATIC VASCULATURE

Cirrhosis exhibits a variable disease picture which depends on the etiologic factor and the stage of the disease. Watson (1952) has offered a useful classification of types, one being primarily fatty in pathogenesis as it results from dietary deficiency or alcohol and the other being nonfatty in origin. Postnecrotic types are included in the latter group.

Popper and Schaffner (1954) observed that modification of the fatty liver syndrome by such factors as nonspecific intercurrent infections and toxins possibly accounts for the transition of the simple fatty liver into hepatic insufficiency and cirrhosis formation.

According to Himsworth (1950) postnecrotic scarring of the organ follows major insults to the hepatic tissue with extensive destruction. In the final stages the liver is divided by coarse bands of fibrous tissue which divide areas of normal liver lobulation. Diffuse hepatic fibrosis also may occur and is marked by a fine fibrosis throughout the whole of the liver so that instead of being distorted and nodular it is uniformly granular. Neither normal portal or hepatic veins are found once the lesion has developed.

Himsworth (1950) believes that derangement of the blood supply is the prime factor in the maintenance of chronicity of the hepatic fibrosis. The agent which is responsible for the initial toxic effects on the liver cells is in itself only indirectly a cause of the eventual cirrhosis. Differences in the circulation in various areas of the organ account for the many types of necroses seen.

Popper (1954) has outlined the morphologic characteristics of the cirrhotic liver, defining the disease as a chronic hepatitis with parenchymal and mesenchymal manifestations including scarring. There are numerous phases of the over-all process and, in his estimation, the term "Laennec cirrhosis" not infrequently fits the end stage of many etiologic varieties of the disease. Generally there is degenerative change in the liver tissue, with various degrees of collapse of the surrounding liver structure. Intralobular scarring, proliferation of the periportal connective tissue, and the formation of portal hepatic venous shunts occur. Likewise there are proliferation of the biliary ducts and regeneration of the liver cells with formation of pseudoadenomas (Fig. 2). According to Elias and Popper (1955), the human liver may have a predilection for centrolobular stasis and necrosis based on the generally difficult sinusoidal drainage and sphincterlike action of large hepatic veins.

The nodule areas of pseudoadenomas create a particular problem of surgical significance primarily because of the manner in which they affect the hepatic vasculature. There is some variance of opinion as to whether they derive their blood supply from pre-existing channels or from the highly vascular surrounding connective tissue. Wakim and Mann (1942) found that in experimental cirrhosis the regenerated areas were revascularized by the hepatic artery. Kelly (1905) in his studies showed that the regenerated nodules did not contain hepatic veins and that both the central and portal veins were decreased in number and peripherally placed. He believed that expansion of the regenerating nodules compressed the hepatic stroma and the vascular elements contained in it. Kretz (1905), as cited by Moon (1934), noted that an injection mass introduced into the portal vein of cirrhotics passed directly into the hepatic vein without penetrating much liver tissue. He observed many nodules without hepatic veins, and these could be injected only through the hepatic artery. They were impervious to injections via the portal vein.

Kelty *et al.* (1950) found, too, that regenerating lobulations compressed the hepatic blood supply in the perilobular connective tissue. Contraction of this connective tissue framework did not seem to occur. Elias (1951) also believes that vigorous nodular growth causes flattening of the hepatic veins (Fig. 2). However, the portal veins remained cylindrical with their terminations in a basketlike meshwork about the nodules. Frequent branches between the portal intraseptal branches and the intraseptal portions of the hepatic veins occurred. The hepatic artery branches continued straight and in some cases anastomosed with portal venous elements.

According to McIndoe (1928), who studied the hepatic circulation with injection casts, a marked reduction of the portal venous bed

occurs in cirrhosis. This is not true of the hepatic arterial branches. Dock (1942), using lead and gelatine injection preparations, noted arterial hyperplasia in alcoholic cirrhotic livers but not in other toxic cirrhotic livers. Mann *et al.* (1953) also noted considerable distortion of the vasculature in their injection-corrosion specimens. This was likewise seen by Steinberg and Martin (1946) in experimental cirrhosis induced by butter yellow. Recently, Madden and his associates (1952, 1953) have also made casts of cirrhotic livers and found obstruction of the outflow tract of the vascular bed. Ascites was particularly correlated with the findings and on a pathologic basis was not deemed remediable by current vascular surgery techniques.

Perfusion studies have similarly led to considerable knowledge of the hepatic vascular bed in the disease. Herrick (1907) compared normal and pathologic postmortem specimens, perfusing them with saline solution after a preliminary washing-out process. Generally, the portal venous bed was not reduced, and when the hepatic artery was perfused a direct connection was found between it and the portal circuit. These communications seemed more evident in cirrhotic livers. The hepatic arterial bed was also increased in the cirrhotic livers. This work was confirmed by Eppinger (1925) and re-evaluated by Dock (1942) with the use of kerosene. Dock was able to confirm Herrick's studies only in some alcoholic cirrhotic livers. Egbert and Raber (1952), perfusing normal and cirrhotic livers with tap water, observed that increased hepatic artery pressures elevated the rate of flow and pressure in the portal vein in cirrhotic livers but not in normal ones.

In chronic cirrhosis there is a considerable development of collateral circulation (McIndoe, 1928) within the liver which is directed toward channels connecting the capsule with the diaphragm and lumbar regions. These constitute the so-called hepatopetal routes as classified by Pick (1909). Hepatofugal routes of the collateral flow were divided by McIndoe (1928) into three varieties: those at the two sites of transition from glandular to squamous epithelium in the gastrointestinal tract, e.g., at the cardioesophageal junction and the anus, those at the round ligament of the liver in obliterated fetal vascular remnants, and, finally, those in the retroperitoneal veins. In addition, as has been pointed out, considerable shunting occurs within the liver substance through direct connections between the portal system and the hepatic veins. The various collaterals have been illustrated by Rousselot *et al.* (1953) in portal venograms.

FIG. 2. Stereogram of the hepatic vasculature and parenchyma in human cirrhotic liver. (Courtesy of H. Elias and G. D. Searle and Company.)

Information as to anatomic changes in the liver lymphatics occurring in clinical cirrhosis is meager. Holman (1951) has indicated that he has observed huge lymphatic channels in the porta hepatis when performing porta caval shunt procedures.

THE SURGICAL PHYSIOLOGY OF HEPATIC CIRRHOSIS

The surgical physiology of cirrhosis is intimately related to the hepatic circulation, and the extent of the blood flow through the organ and the determination of the degree to which the portal and hepatic arterial circuits contribute to this flow are basic to the understanding of the effects of various surgical procedures.

Measurement of the flow in normal livers has been made in human beings with the urea excretion method (Myers, 1947), the bromsulphalein technique (Bradley *et al.*, 1945, 1946), radioactive colloidal gold (Velter *et al.*, 1954), and colloidal radioactive chromic phosphate (Nardi, 1955). In dogs the flow has been determined with stromuhrs (Burton-Opitz, 1910, 1911), (Grindlay *et al.*, 1941), (Soskin *et al.*, 1938), (Schweigk, 1932), (Herrick *et al.*, 1934), (Grab *et al.*, 1929), (Grodins *et al.*, 1941), by direct measurement of the blood flow (Macleod and Pearce, 1914), (Blalock and Mason, 1936), with the urea excretion method (Lipscomb and Crandall, 1947), and the bromsulphalein tech-

nique (Werner and Horvath, 1952), (Hallet *et al.*, 1952). In rats internal calorimetry has been used to determine the flow (Grayson, 1953).

The commonly used bromsulphalein method of clinically measuring the blood flow in the liver has been criticized by Cohen and his associates (1948) who believe the high rate of extrahepatic removal of injected dye invalidated the use of the substance. It has been further evaluated by Brauer and Pessotti (1950) and Myers (1947).

According to Bradley's studies in the human being, the total hepatic blood flow is in the range of 1,500 cubic centimeters per 1.73 square millimeters per minute. In dogs, Hallet *et al.* (1952) have estimated the hepatic flow at 1.5 cubic centimeters per gram of liver tissue.

Barcroft and Shore (1912) found that the hepatic artery accounted for 34 per cent of the liver blood flow in fasting anesthetized cats. Blalock and Mason (1936) noted that the hepatic artery contributed 22 to 38 per cent of the oxygen content of the hepatic venous blood in 5 of their dogs, and 58 to 62 per cent in 2 others. In their study, constriction of the hepatic artery resulted in 19.5 per cent reduction of the hepatic vein flow. The hepatic artery oxygen tension was found to be that of arterial systemic blood, varying within the 18 to 20 per cent limits. Portal venous blood, on the other hand, had an oxygen content of 13 to 16 volumes per cent. According to Wiggers the portal system carries the major share of oxygen to the hepatic tissues because of the greater relative amount of portal blood flow.

In the study of Bollman and Grindlay (1953) conventional hepatic artery ligature in normal dogs did not result in reduction of the hepatic blood flow, although portal ligature and partial hepatectomy did. Eck fistulization has been shown by Hallet *et al.* (1952) also to reduce the flow.

The contributions of blood to the portal system from various organs have been outlined by Baronofsky (1949) from data of Burton-Opitz (1908, 1909, 1910, 1911). The total portal inflow into the liver was determined to be 4.92 cubic centimeters per second. The intestine contributed 2.74 cubic centimeters per second, the stomach 1.23 cubic centimeters, and the spleen 0.95 cubic centimeters. Baronofsky has noted that the combination of stomach and spleen accounted for approximately 44 per cent of the total portal inflow. Blood flowing from the spleen, according to Olerud (1953) as quoted by Smith *et al.*, (1953), is highly oxygenated.

Grindlay *et al.* (1941) have observed considerable variation in the flow of blood through the liver and this has been substantiated by Werner and Horvath (1952) and Smith *et al.* (1955). Thus, the organ, or portions of it, may alternately store and discharge blood. Wakim and Mann (1942) believe that up to 75 per cent of the hepatic circulation may be inactive under ordinary conditions. In transillumination studies some sinusoids were found to contain motionless blood, while others had no blood in their potential lumina.

Although the liver is the chief source of heat production in the abdomen, attempts to correlate the fluctuations in liver temperature with the fluctuations in liver blood flow have not been successful (Birnie and Grayson, 1952). Apparently the oxygen needs of the liver are low as indicated by the moderate oxygen quotient of the hepatic tissue (Holmes, 1937).

In the cirrhotic individual the hepatic blood flow has primarily been studied. In Bradley's (1950) series, the estimated hepatic blood flow fell below normal levels. Measurements of the hepatic oxygen uptake showed a reduced liver hepatic venous oxygen concentration, and what seemed to be an augmented arteriovenous difference in many cases. In Bradley's opinion this lowered arteriovenous difference indicated a slower rate of perfusion of the hepatic tissue or possibly liver ischemia. Velter *et al.* (1954), using colloidal radioactive gold, corroborated the reduced flow in cirrhotic livers and indicated a level approaching from one-third to one-half of normal in males and females, respectively. Kessler *et al.* (1954) indicated, too, that in alcoholic cirrhotic livers fatty infiltration did not alter the flow.

Following a series of shunt procedures, Bradley found that the estimated hepatic blood flow fell. With the fall in the portal pressure the flow was reduced and a reduction in oxygenation was noted. It would appear that the cirrhotic liver gets a great supply of oxygen through the portal system or, as indicated by Bradley *et al.* (1952), there is an increased extraction of oxygen with the slow liver perfusion associated with shunting. In his cases Bradley did not observe marked differences between patients with ascites and those not having this symptom. Nardi

(1955), likewise, studied a series of patients with portasystemic venous shunts and found that hepatic blood flow was reduced by the procedure. The 2 patients with the greatest reduction in blood flow died in the postoperative period.

Myers (1950) studied the hepatic blood flow in Laennec's cirrhosis and found that there was a low oxygen removal by the gastrointestinal tract; he based this opinion on studies of the blood in the umbilical and portal veins. In his view oxygen differences between hepatic vein and hepatic artery blood were due to hepatocellular activity. In dogs rendered cirrhotic by carbon tetrachloride, Bollman and Grindlay (1953) noted that hepatic artery ligature reduced the hepatic blood flow. This was also observed clinically by Rienhoff (1951).

THE HEPATIC ARTERY

The effects of ligation of the hepatic artery have been reviewed by Markowitz and Rappaport (1951). Historically this procedure was originally performed by Malpighi (1699) and subsequently studied by De Metz (1828) in pigeons, by Cohnheim and Litten (1876) in rabbits, and by Haberer (1905) in various mammals. More recently a host of workers have re-examined the procedure. Cameron and Mayes (1930), for example, found that in rabbits ligature of the hepatic artery beyond the gastroduodenal branch resulted in liver necrosis, but not if done proximal to this artery. Huggins and Post (1937) found that ligature of the hepatic artery in dogs was fatal, but not if done in stages. Fraser and his associates (1951) corroborated the danger of ligature in the dog. Burnett *et al.* (1951) observed that in the rat hepatic arterial blood was not essential for normal liver cell function. Child and his group (1952) used monkeys because the vasculature of these animals closely resembles that of man. They found that these animals, in many instances, could survive hepatic arterial ligature, although some developed liver abscesses. Jefferson *et al.* (1952) noted that total hepatic arterial excision in the dog was usually fatal, survival depending on the extent of collateral flow to the liver. If devascularization is staged (Popper *et al.* 1954 and Rappaport *et al.*, 1954) the liver can survive and the animal lives with only collateral circulatory support.

Liver necrosis following ligation of the vessel usually occurs in 12 hours or later, and the effects are rather sudden with animal malaise, lethargy, and rapid death. Recently Markowitz *et al.* (1949), Davis *et al.* (1949), Tanturi *et al.* (1950), Grindlay *et al.* (1951), Jefferson, *et al.* (1952), Zannini and Esposito (1952), Bariatti and Degradi (1952), and Milnes (1952) have pointed out that penicillin and other antibiotics are of benefit in preventing death from hepatic artery ligature in dogs.

The cause of death in these animals has for the most part been attributed to a massive anaerobic infection of the liver resulting from disturbance of the hepatic blood supply. Wolbach and Saiki (1909) isolated a large spore-bearing gram-positive anaerobe in the liver of dogs. Ellis and Dragstedt (1930), likewise, found that the normal dog liver contained a gram-positive anaerobe. Mason and Hart (1940) found that human livers contained a Welch-like bacillus; however, Manson (1949) found anaerobes in dog livers but very rarely noted them in human material. Similarly Lewis and Wangensteen (1950) isolated Aerobacter aerogenes and staphylococci in some human livers, but were not able to show the Welch bacillus. Romieu and Brunschwig (1952), Desforges *et al.* (1953) and De Long (1953) reached a similar conclusion concerning the sterility of the human liver. De Long (1953) also believed the rat liver to be free of organisms. Fraser (1950) quotes Mitchell as having found the Clostridium welchii in horse livers.

In the dog with ligature of the hepatic artery it has been assumed that the anaerobes which are normal inhabitants of the liver multiply which causes hepatic necrosis and death. However, there is some intimation that these anaerobes may ascend from the colon, rather than emanate from the liver (Rappaport, 1951).

Hepatic anoxia in itself may be a factor in the liver damage resulting from hepatic artery ligation. In experimentally induced cirrhosis, Glynn and Himsworth (1944) and Himsworth (1950) believe that deprivation of oxygen may be of importance in the promotion of liver necrosis, and that one function of hepatic blood is to provide oxygen to the liver cells at high tension. Buchner (1942), Goldsmidt (1937), and Martin *et al.* (1916), according to Himsworth (1950), have noted hepatic destruction following anoxia. Trowell (1943, 1946), also, has observed vacuolization in the livers of rats after anoxia.

Tanturi *et al.* (1950) found lecithinase in the abdominal fluid of dogs that died from hepatic artery ligation and believe that this enzyme is one of the main lethal factors involved in the deaths. It was also found that the survival time of animals could be increased if the dogs had been given Welch alpha toxin immunization preoperatively. In animals treated neither with the Welch alpha toxin nor with antibiotics, profound liver changes occurred and also changes in the adrenal cortex. These changes were accompanied by hypoprothrombinemia, hyperphosphatasemia, hypoglycemia, hemolysis, and hemoconcentration. Rappaport and Lotto (1951) have also studied hepatic coma resulting from liver ischemia. They observed wide central hemorrhagic necrosis occupying the entire lobule in dogs which had been Eck-fistulized and subjected to a second stage hepatic artery ligation. Collens *et al.* (1926), likewise, found preterminal hypoglycemia after hepatic artery ligature.

The effects of temporary occlusion of the hepatoduodenal ligament in dogs has been studied by Duchinova (1926). He found that a 5 minute compression caused a marked drop in the blood pressure. Wangensteen (1950) produced temporary liver hemostasis clinically in order to resect portions of the liver. This was done for periods of 24, 33, and 30 minutes, and in the latter 2 cases oliguria and death occurred. Thomas and Essex (1949) observed that, in dogs, ligature of the hepatic artery for more than 2 hours was followed by hepatic venous constriction. Selkurt (1954) observed that, in the dog, constriction of this artery resulted in reduced bromsulphalein extraction and particularly in the animals kept ischemic for more than an hour and a half. DeWeese and Lewis (1951) alternately occluded the hepatic artery for 20 minutes and released it for 5 minutes for a total of 80 and 120 minutes in 2 dogs, respectively. This had no ill effects on these animals. Raffucci (1953) found that 20 minutes was the limit of time that hepatic artery and portal vein occlusion could be tolerated. This time was increased somewhat by the use of antibiotics and intermittent occlusion. ACTH decreased the mortality rate somewhat.

Grindlay *et al.* (1953) found that the hepatic venous pressure was not changed materially by hepatic artery ligature just distal to the gastroduodenal branching in the dog, while Thors *et al.* (1953) found that the oxygen concentration of hepatic venous blood was not affected by such a ligature in the normal liver, or in a liver rendered cirrhotic by carbon tetrachloride. However, ligature of all arterial branches did temporarily lower the oxygen concentration from 28 to 50 per cent. Bollman and Grindlay (1953) found that ligation reduced the hepatic blood flow in the cirrhotic dog, but not in the normal one.

According to Berman *et al.* (1951) and Caldwell *et al.* (1954), ligature of the hepatic and splenic arteries will lower the portal blood pressures. In dogs with experimentally produced constriction of the inferior vena cava above the diaphragm, ligature of the hepatic artery dropped the portal pressure 10 to 15 milliliters and splenic artery ligation caused a further fall totaling from 30 to 40 milliliters. DeWeese and Lewis (1951), Fitzpatrick *et al.* (1952), and Balfour *et al.* (1954), however, found that in their dogs hepatic artery ligature did not significantly lower the portal pressures. Both Caldwell *et al.* (1954) and Baret and Fitts (1955) have shown that in dogs rendered cirrhotic by carbon tetrachloride, hepatic artery ligature will lower the portal pressure. As shown by Caldwell *et al.* (1954), this pressure drop may be only temporary.

Berman and Hull (1952) and Laufman *et al.* (1952) have reported on the reduction of experimental ascites by ligature of the hepatic artery in dogs. This procedure has been shown by Tanturi and Ivy (1938) also to cause a decrease in the amount of bile formation.

Clinically, cases in which ligation of the hepatic artery have been performed for aneurysms of the hepatic artery have been reviewed recently by Dwight and Ratcliffe (1952). Hepatic artery ligation for the treatment of portal hypertension and ascites was introduced by Rienhoff (1951) and Berman and Hull (1952). Variable results have been obtained with this therapy by many workers, including Madden (1952, 1953), Jahnke *et al.* (1953), Smith *et al.* (1953), and Witter and First (1953). Rosenbaum and Egbert (1952) have noted an instance in which hepatic artery ligation presumably caused liver necrosis. To prevent this, Berman and Fields (1954) have advocated gradual ligature of the vessel.

THE PORTAL VENOUS SYSTEM

The effects of portal ligation are of interest primarily from a physiologic standpoint. The his-

torical aspects of the procedure have been outlined by Boyce (1941). According to this author, Ore (1856) was the first to show that ligature of the portal vein in rabbits resulted in prompt death, a finding that was corroborated in dogs by Schiff (1863). Bernard (1877), Pappenheimer (1872), Solowieff (1875), Kusnetzow (1900), Rouse and Larimore (1920), Tchernikoff (1931), and Elman and Cole (1934) also studied this problem. The result of their experiments indicated that portal venous occlusion was generally fatal in rabbits and dogs, but not necessarily so when gradually induced. Death in these cases was related to intestinal vascular stasis, although other neurogenic factors were also considered accountable (Boyce, 1941). Liver atrophy was associated with the ligation of isolated portal branchings (Rouse and Larimore, 1920), and these authors questioned whether portal blood contained a specific hepatic nutritional substance. According to Child *et al.* (1952) the monkey can survive acute portal ligature.

The subject of gradual portal occlusion was re-evaluated by Douglass (1951) in dogs, with the finding that doubling the portal pressure was fatal in about one-half of the animals, but chronic portal hypertension and ascites did not develop in them. This author also observed that the use of penicillin did not materially affect the fatal course associated with sudden complete portal occlusion. The failure to develop chronic portal hypertension and ascites was corroborated by Morris and Miller (1951) and Peck and Grover (1952). Child (1955) indicates that portal pressures in primates will always return to normal after portal occlusion, and he believes that portal hypertension in the human being cannot be explained on a portal block theory.

Generally the length of time that the portal vein may be acutely occluded with animal survival is not known. It is, of course, dependent on species susceptibility to the procedure. Raffucci (1951) found that dogs could not survive longer than 20 minutes of occlusion of all vascular structures in the hepatoduodenal ligament. Roger, according to Boyce (1941), ligated the portal vein for 3 hours in dogs and one-half hour in rabbits without serious damage. Boyce also stated that Duchinova (1926) compressed the portal vein for 35 minutes with impunity and Tchernikoff (1931) conducted experiments with repeated compression and release of the portal vein.

Estimation of the normal portal pressures has been made by Whipple (1949) and Bellis (1942) in human beings with average results of 60 to 140 millimeters of water and 14 to 220 millimeters of saline solution, respectively. Hoffbauer *et al.* (1948) and Grindlay *et al.* (1953) have studied this pressure in dogs. Grindlay, utilizing the indwelling catheter technique, observed the mean pressure to be 7.2 centimeters in this animal. Taylor (1954) has shown that the pressures are greatly dependent on external forces.

In cirrhosis the pressures are generally raised. This has been studied by Davidson *et al.* (1950) and Pattison (1949). In the latter's report, the patients with varices but without ascites had pressures of 33, 35, 40, and 60 centimeters of water, respectively, while those with ascites generally had lower pressures.

A relation is believed to exist between portal oxygenation and the systemic blood pressure. In cross circulation experiments in which arterial donor blood was projected into the portal system the animals were better able to stand hemorrhagic shock (Frank *et al.*, 1946). VDM, or ferritin, (Shorr *et al.*, 1945) is reputed to be a factor in shock production and supposedly is destroyed in anaerobic media. Hampton *et al.* (1952), however, found that increased tissue ferritin failed to affect the mortality rate and the mean death time of rats subjected to trauma.

That ligature of the hepatic artery will affect the portal pressures has been previously indicated. A direct relation is also believed to exist between the portal venous and the systemic arterial pressure. Davis *et al.* (1949) has shown that a sustained drop in the systemic pressure occurs with portal ligature and that this is not grossly affected by a subsequent Eck fistula. Peck and Grover (1952) found that acute portal occlusion caused an immediate blood pressure drop leading to death.

The flow of blood to the liver via the portal vein occurs in a laminar fashion, the flow from the intestine being directed to the right lobe predominantly. This has been demonstrated physiologically by Hahn *et al.* (1945). No particular significance has been noted in this in terms of assigning particular functions to either the right or the left liver lobes, but perhaps it is a fact to consider with regard to the localization of liver necrosis following dietary deficiencies (Glynn and Himsworth, 1944, 1948). According to these authors the left lobe is most frequently damaged

and, thus, sulphur amino acids from the small intestine are protecting the right lobe or, as Gyorgy (1951) has indicated, some toxic agent from the large intestine is reaching the left lobe and causing more damage there.

Eck fistulization (Eck, 1877) has been performed on animals for many years and the physiologic effects of the procedure are fairly well known at present. However, the results vary with the extent of the shunt established. Preshaw *et al.* (1951) found that dogs do not tolerate carbon tetrachloride as well when subjected to complete shunting of the portal blood as when subjected to partial side-to-side shunts. It is conceivable that shunts will vary further in their physiologic results on the basis of their location and the degree of intestinal blood that is shunted. Hallet *et al.* (1952) found a decreased hepatic blood flow after the procedure. Whipple and Hooper (1917) observed that the liver assumed a smaller size, and it was found by Mann and Magath (1922) and Mann *et al.* (1931) that regeneration of the liver tissue in hepatectomized animals will not occur in the presence of this vascular defect.

In a few studies Eck fistulas have been used to remove the liver partially from its major blood supply. Hahn *et al.* (1893) found that this plus hepatic artery ligature resulted in the death of dogs in 6 to 15 hours. Macleod (1908) noted a fall in the blood sugar after a similar procedure. Rappaport and Lotto (1951) have also used this method to induce and study hepatic coma. Mann and Bollman (1926) varied the technique by excising segments of the liver in conjunction with the production of an Eck fistula. They noted little change in liver function after this.

Reverse Eck fistulas have been produced to elevate the portal pressure (Mann and Magath, 1922). This results in the rapid formation of collateral channels. Following this the portal vein can be ligated with impunity. Esophageal varices have not been reported with the use of this method.

Markowitz (1949) has observed that although animals may survive the procedure of Eck fistulization their status is not a stable one. According to Laws and Johnson (1952) the diminished hepatic blood flow and direct shunting of portal blood around the liver into the systemic circulation may result in the elevation of the plasma concentration of digestive products to a toxic level. This may explain the so-called "meat intoxication" syndrome from which these animals supposedly suffer. McDermott and Adams (1954) have attributed this disturbance to elevated blood ammonia.

Portacaval shunting was originally proposed by Eck partially for possible use in the treatment of ascites. Historically it has been utilized in man by Vidal (1903), De Martel (1910), and Rosenstein (1912). Recently it has been employed extensively for the treatment of portal hypertension and its associated symptoms (Blakemore, 1951, 1952), Linton (1951), Jahnke *et al.* (1953), and others.

Little is known of the effects of arterialization of the liver by the production of a systemic artery-portal venous fistula. The experiments of Frank *et al.* (1946) and the theoretic implications of Shorr's (1945) studies would seemingly indicate that such a technique might be well tolerated. Conceivably it could be of benefit in the therapy of cirrhosis in that liver regeneration and function might be enhanced. Such fistulas, however, have been produced with difficulty. Markowitz (1949) has performed renal artery-portal vein shunts and quotes Narath (1916) as implanting the hepatic artery into the portal vein. In a few studies following "arterialization" of the portal vein, Markowitz (1949) ligated the hepatic artery. His dogs died overnight, although one survived 12 days with a small shunt.

Hallet *et al.* (1951) has shown an increased hepatic blood flow after the production of an arteriovenous fistula. Cohn and Parsons (1950) found that 2 weeks after the fistula was made, the portal pressure was elevated but ascites was not present. They thought the method protected against hemorrhagic shock. After a year Cohn and Herrod (1952) thought that no deleterious effects had occurred from the procedure, but recently Rather and Cohn (1953) have observed necrotizing arteriolitis and angiitis in the livers and blood vessels of long-term follow-up dogs. Schilling *et al.* (1949) and Schilling and McKee (1950) did not find portal hypertension initially after the "arterialization" procedure, but in 1953 Schilling *et al.* noted deleterious effects in extended studies. Shorov (1951) observed no change in liver function subsequently and found that oxygen tension in the hepatic veins was the same after the arterial shunting. Morris and Miller (1951) were not able to produce chronic portal hypertension or varices with the method.

Experimentally in dogs the portal vein has been arterialized and an Eck fistula performed.

In this technique portal blood is diverted away from the liver, while systemic arterial blood constitutes its entire afferent blood flow. This procedure has theoretic value in the treatment of cirrhosis in that decompression of the portal circuit is provided while the hepatic blood flow and oxygenation are augmented. The author and his associates (1948) attempted this in 15 dogs, applying a vein graft between the right renal artery and the severed distal portal vein after portacaval shunting. Although it was possible to get a few dogs through the immediate postoperative period none survived with patent shunts. At the time of surgery the liver was markedly, although not uniformly, changed in color, having assumed a reddened hue.

Further studies by Julian *et al.* (1949) were also made of this problem in dogs. Following the production of a portacaval shunt, a homologous aortic graft was placed between the distal aorta and the severed portal vein stump. Arterial blood was carried directly into the liver without being diverted through collateral branches of the portal vein. Twenty-two dogs were operated upon and in only 3 of this group was it possible to obtain a 2 week survival with a patent shunt. In one of these animals the liver was examined histologically and revealed no unusual pathologic change. At the time of surgery following arterialization the liver assumed an uneven rosy hue. The procedure did not seem to afford any particular protection from the shock in these dogs. Death was usually of the hepatic coma type.

Strikler *et al.* (1952) have reported an instance wherein a hepatic artery-portal venous fistula occurred in a human being. In this instance the patient developed portal hypertension, varices, and ascites.

Jamison *et al.* (1951) also have been able to obtain animal survival in a few dogs following the simultaneous arterialization and Eck fistulization procedure; on sacrifice of one animal 3 months after surgery hypertrophy of the right auricle and dilatation of the pulmonary artery were found. An absence of lipid was noted in the liver.

In studies by Sharf and Acker (1954) the splenic artery was implanted into the portal vein after the production of an Eck fistula and 16 dogs lived following the procedure. These authors thought the method possibly hindered the hepatic blood flow, although they believed it would not do so in the human being.

Recently Fisher *et al.* (1954) have readily obtained animal survival with autogenous vein grafts in a method greatly similar to that employed by Julian *et al.* (1949). In a series of studies it has been shown that liver regeneration is augmented by the procedure (Fisher *et al.*, 1954) and that the hepatic blood flow is increased two to three times by the method (Russ *et al.*, 1954). Vacuolization of the liver cells has been reported following the arterialization (Fisher *et al.*, 1954).

It is possible that increased oxygenation of the hepatic blood may be harmful to the liver. In this regard Paine *et al.* (1941) observed pathologic changes in dogs following the prolonged respiration of 75 per cent oxygen. It is possible, too, that excess shunting of the blood may be deleterious in these preparations.

THE HEPATIC VEINS

Due to their relative inaccessibility, the hepatic veins have not been subjected to as many physiologic studies as other elements of the hepatic circulatory system; nevertheless, their importance has increased steadily from the time that Budd (1857) and Chiari (1899) described clinical effects due to occlusion of these vessels.

It has been noted by Cohn *et al.* (1954) and Balfour *et al.* (1954) that hepatic venous pressure is elevated in cases of cirrhosis. According to Simmonds and Brandes (1925) occlusion of the hepatic veins in dogs causes a drop in the systemic blood pressure and an increase of blood concentration. Liver enlargement occurs and the flow of lymph in the thoracic duct is increased. Additional studies on hepatic vein occlusion have been done by Brandes (1929), Simmonds and Calloway (1932), and Volwiler *et al.* (1950). Tanturi and Ivy (1939) found that bile formation decreased with elevation of hepatic vein pressure, while Douglass *et al.* (1951) noted that ligature failed to cause cirrhosis, to increase the portal pressure for prolonged periods, or to cause varices. Child *et al.* (1952) noted that monkeys could not survive more than 30 to 60 minutes of complete and sudden occlusion of these veins. Winternitz (1911) and Armstrong and Richard (1944) also recorded hepatic vein ligature experiments. In the latter, the dogs developed anemia and hypoproteinemia.

Evidence for the presence of hepatic vein valves has been presented by Krogh (1912), Krogh and Lindhard (1912), and Essex and

Thomas (1950). In the last study no discrete valve mechanism was demonstrated, but a generalized constricting response occurred on the part of the hepatic veins to noxious stimuli. Friedman *et al.* (1951) has observed a similar reaction following hemorrhagic shock. Dale and Richards (1918) believed that contraction of the hepatic veins could aid in adjusting the blood flow in the liver.

NERVOUS FACTORS

Nervous factors remain an unknown element in the genesis and therapy of liver cirrhosis. Normally, according to Best and Taylor (1950), the "hepatic sphincter" is constricted by peptone and histamine and relaxed by adrenalin or sympathetic nerve impulses. Adrenalin seems also to cause the release of fluid from the liver cells. Grayson and Johnson (1951) found in rats and rabbits that adrenalin had a direct vasoconstrictor effect on the liver vessels, but generally because of its effect on the blood pressure, it increased the hepatic blood flow. Friedman *et al.* (1951) found that dibenamine dilated portal and hepatic vessels constricted by hemorrhagic shock.

Senevirante (1949) thought the liver vascular tree to be innervated by sympathetics, but devoid of parasympathetic innervation. He believed that liver disease itself had a psychosomatic basis via the sympathetic system. According to Sherlock *et al.* (1954), nitrogenous substances of portal venous origin may cause a cerebral disturbance. Wakim (1942) found that electric stimulation of the hepatic plexus caused constricting hepatic effects; on the other hand, vagal stimulation did not influence the liver blood flow. Daniel and Pritchard (1950) believe a nerve-controlled superficial shunting mechanism is present in the liver vasculature.

Markowitz (1949) has attempted the stripping of nerves from the hepatic artery in the portal fissure to increase the hepatic blood flow, while Laufman (1954) has tried sympathectomy of appropriate fibers to reduce the tone in the portal system and lower the pressure. In this last instance the effect was negligible in animals with induced portal hypertension.

LIVER REGENERATION

The manner in which the liver regenerates is of great importance in cirrhosis and has been a subject for considerable physiologic investigative work. Partial hepatectomy is a technique frequently employed to assay the value of various measures designed to promote regeneration. It has been found that the capacities of restitution of hepatic substance are considerable and are aided by various dietary fractions (Ravdin and Vars, 1951), as well as hormonal constituents (Friedgood *et al.*, 1950).

The hepatic vasculature likewise plays a major role in determining the ability of the liver to reconstitute itself. Mann and Magath (1922) found that Eck fistulization prevented regrowth, while Mann *et al.* (1931) believed that restitution follows partial hepatectomy provided there is no interference with the arterial supply or bile ducts. Higgins *et al.* (1932) noted that an increased blood flow to the liver in chickens enhanced regrowth, while Mann (1940) confirmed the view that Eck fistulization was deleterious to restoration of the sectioned liver. Microscopically, regenerated and normal liver appeared similar, although Aterman (1952) has noted vacuolization in regenerated specimens.

Grindlay and Bollman (1952) noted little or no reconstitution in dogs with occlusion of the portal vein or an Eck fistula, although release of the obstruction or ligature of the vena cava above aided regeneration. The effect of hepatic artery ligation on regenerative capacity has been ascertained by Wiles *et al.* (1952). In the dog the ligation did not affect liver restoration after partial hepatectomy. Child *et al.* (1953) found that after portal vena cava transposition liver regeneration occurred readily, which indicated that decreased hepatic blood flow is the prime cause of failure of restitution rather than a specific portal venous substance. Fisher *et al.* (1954) have shown that in the presence of an Eck fistula "arterialization" of the liver will augment hepatic regeneration.

Cameron and Karunaratne (1936) studied the effects of carbon tetrachloride-induced cirrhosis in relation to liver regeneration in rats. They employed a number of methods including histologic examination, partial hepatectomy and regeneration, and grafting of liver transplants. They concluded that precirrhotic changes were reversible, but the cirrhotic were not. Morrione (1951) has also showed ability of the rat liver to restore itself after the induction of carbon tetrachloride damage, and Ungar (1951) and Ungar and Feldman (1953) have shown that the liver can absorb new fibrous tissue. Gilman *et al.* (1952) take the more radical view that, if the

diet is correct, even large fibrous bands in the liver can be made to disappear completely.

EXPERIMENTAL ASCITES

As Snell (1950) has indicated, multiple factors cause ascites. These include increased portal venous pressure, lowered osmotic pressure of the serum associated with decreased serum albumin, disturbances in the lymph flow as caused by hepatic venous constriction, an excessive antidiuretic factor, a possible vasodepressor mechanism, and disturbances in the electrolyte metabolism. Child (1955), in reviewing the subject of ascites, concludes that most ascitic fluid is extravasated from the liver surface and is due primarily to intrahepatic venous hypertension. Splanchnic congestion, too, plays some role in the fluid formation.

That the ascitic fluid permeating from the liver surface is related to excessive lymph flow in the liver has been suggested by Bolton, as quoted by McKee *et al.* (1949). Most workers, however, although demonstrating the relationship between cirrhosis and lymph production by the liver, have not directly related ascites to the lymph. Interesting data on hepatic lymph have been accumulated since the early studies of Heidenhain and Starling (1894). Starling noted that liver lymph was secreted or formed as a result of simple hydrodynamic principles. Obstruction of the vena cava was without effect on the lymph flow if the portal lymphatics had previously been ligated. Likewise, extirpation of a 6.5 foot length of intestine was without effect, as well as ligation of the hepatic artery. Although a prime source of lymph production, the liver is not essential for it (Markowitz and Mann, 1931). Cain *et al.* (1947) and Nix *et al.* (1951) have shown increased liver lymph production in dogs with experimental cirrhosis. This has likewise been demonstrated by Nix *et al.* (1951) in rats. This lymph flow increase does not occur in the intestine.

The method most often utilized for producing experimental ascites has involved partial ligation, or ligature, of elements of the hepatic venous or supradiaphragmatic vena cava system. Historically, ascites has been produced in animals by variations of this technique by Tilman (1899), Bolton (1903, 1909, 1914, 1916), Bolton and Barnard (1931), Whipple and Sperry (1909), Zimmerman and Hillsman (1930), Boyce (1941), Kershner *et al.* (1946), Kunkel and Eisenmenger (1949), and Parsons and Holman (1950). McKee *et al.* (1948, 1949, 1950) also used vena cava obstruction and observed that protein and salt intake influenced the amount of fluid accumulation. Volwiler *et al.* (1950) noted that ascites produced by this method was spontaneously reversible, and Milnes (1951) found that portal ligature did not relieve the ascites.

Berman and Hull (1952) noted that ascites due to vena cava occlusion in the chest could be alleviated by hepatic and splenic artery ligation, and increased by reverse Eck fistulization. Milnes (1952) has corroborated the hepatic and splenic artery ligation effects. Laufman *et al.* (1952) found that the greater the extent of hepatic artery ablation, the greater the reduction of this form of experimental ascites, but at the same time the higher the mortality rate. Bernhard *et al.* (1953) have shown that midgut intestinal resection will also relieve the ascites of caval occlusion, while Neumann *et al.* (1955) indicate that a pedicled flap of ileal mucosa within the peritoneal cavity will likewise reduce ascites formation. Davis *et al.* (1949) have shown the profound effect of hormonal elements on ascites in that hypophysectomy materially stemmed fluid formation in their animals.

There have been only a few attempts to produce ascites by experimental liver injury. This has been accomplished by Hahn *et al.* (1951, 1953) using radioactive gold and phlebotomy. Cain *et al.* (1947) and Nix *et al.* (1951) have indicated that ascites occurs in some animals following the administration of carbon tetrachloride.

Clinically, a host of procedures for the treatment of ascites have been utilized and classified by McKee *et al.* (1949). Recently portacaval shunting and hepatic artery ligation have aroused much interest. Opinion is conservative regarding these measures. For example, Blakemore (1951, 1952) believes that portal hypertension may be a factor in the persistence of ascites and, if present, a shunt operation will give improvement. Child (1955), likewise, is of the opinion that vascular shunting may aid certain cases of ascites with splanchnic congestion. Linton (1955), too, voices this conservatism, holding a place for shunting if the serum albumin is relatively normal. As shown by Habif (1953), results in many instances will depend on electrolyte management.

Hepatic and splenic artery ligation in the treatment of wasting ascites is also being employed

on an experimental basis. However, results as recently tabulated by Altmeier *et al.* (1955) have not been encouraging. Moore *et al.* (1949) have suggested splenic artery ligature to palliate the symptom. Of interest also is the belief of Fuller *et al.* (1937) that excision of a length of bowel will reduce portal inflow and therefore be of value in ascites therapy. They utilized this method in one case with success. Laufman (1954) indicated that resection of the middle 50 per cent of the small bowel may be of value in some instances of ascites.

Shull, as quoted by Linton (1951), states that the mortality rate in ascites may be as high as 54 per cent in a year if only medical measures are utilized in treatment. It is against this that the relatively high mortality rates of extensive intra-abdominal procedures for treating this symptom must be balanced. Generally, these mortality figures are considerably higher than when the same operative measures are employed for bleeding varices, and probably they are indicative of greater liver damage.

EXPERIMENTAL PORTAL HYPERTENSION

Experimentally the pressure in the portal venous system may be acutely elevated, but production of chronic portal hypertension is complex and trying. For example, as previously indicated, Douglass (1951) found that partial portal occlusion did not result in prolonged elevation of portal tension, while Volwiler *et al.* (1950) reached a similar conclusion with a two stage portal ligature. Higgins *et al.* (1932) utilized a form of reverse Eck fistula in fowl to augment the portal flow. However, with the development of collateral channels, even this method allowed for reduction of tension toward normal. Volwiler *et al.* (1950) indicate that even ascites produced by constriction of the thoracic inferior vena cava will gradually disappear, presumably because of reduction of the portal pressure with the formation of collateral circulation.

Rousselot and Thompson (1939) employed silica injected repeatedly into the splenic vein of dogs to produce cirrhosis and portal hypertension. After the first 18 months the pressures in the portal system were respectively 22.5, 23, 26, and 29.5 centimeters of water. Ascites did not occur.

Grindlay *et al.* (1951) repeated this study with intraportal injection of ground quartz. In 15 months they found an extensive collateral circulation, but again no ascites. In their dogs, too, portal pressures were elevated.

Volwiler *et al.* (1953) state that moderate ascites may appear as a late complication of silica fibrosis of the livers of dogs. As yet a reliable method for the regular production of esophageal varices in the dog has not been reported.

Attempts at producing portal hypertension by means of arterioportal venous fistulas have had variable results, as previously noted.

Clinically, in cirrhosis the portal pressures are usually raised (Davidson *et al.*, 1950 and Pattison, 1949), but Whipple (1945) has indicated that the degree of tension varies in different types of cirrhosis, in patients with the same type of cirrhosis, and even in the same patient. Bennett *et al.* (1953) have called attention also to this latter variation in portal pressure. These authors point out that alteration in the collateral circulation or reduction of fatty infiltration of the liver accounts for the fluctuations. High portal pressures may be associated with instances of bleeding from varices, but this is not always true. In the study of Pattison (1949) pressures were slightly lower in cirrhotic patients with ascites than in those without ascites. Laufman (1954) has recently reviewed the general subject of portal hypertension.

ESOPHAGEAL AND GASTRIC VARICES

The creation of esophageal and gastric varices is extremely difficult in experimental animals. This has been accomplished, however, by Rousselot and Thompson (1939) following the production of cirrhosis in dogs. Baronofsky and Wangensteen (1945) have reported a means whereby with tying of the splenic and portal veins they, too, have been able to produce varices. Following the administration of a histamine-beeswax preparation, these varices could be made to bleed. Morris and Miller (1951), however, were not able to cause any appreciable segmental or local venous hypertension of the cardia of the stomach of dogs with simultaneous ligature of the splenic vein. At best, the varices produced in experimental animals have never been the equal to those found in man.

Clinically, the cause and nature of esophageal varices is not clearly understood and for the most part has been avoided in textbooks of gastroenterology. Portal hypertension is undoubtedly a factor, although as pointed out by Morton and Whelan (1954), varices may occur without ele-

vation of the portal tension. Baronofsky (1949), Chiles *et al.* (1953), and Wagnecht *et al.* (1953) have called attention to the importance of the acid-peptic factor in the precipitation of bleeding.

Atik and Simeone (1954) have indicated that in massive upper gastrointestinal bleeding, varices next to ulcers account for most of the hemorrhages. Kane *et al.* (1955) found, however, that bleeding varices were the greatest cause of death. Ratnoff and Patek (1942) observed that hematemesis occurred in one-eighth of the patients with cirrhosis and almost one-half of these died presumably from ruptured varices. Ratnoff and Patek (1955) found that one-third of their patients with postnecrotic cirrhosis bled, and all who survived bled again later. Most of them died within a year. Linton and Warren (1953), reviewing the problem, found that exsanguination was the prime cause of death in 72 per cent of cirrhotic patients with bleeding varices. Most of them could not be prepared for the shunt type of surgery.

A variety of surgical methods have been developed to inhibit medically uncontrollable hemorrhage from varices. These have recently been outlined by Linton and Warren (1953) and Bennett *et al.* (1953). A brief review of these procedures would include splenectomy (Noya Benitez, 1951), ligation of the splenic artery (Blain, 1918, and Everson and Cole, 1948), ligation of the hepatic and splenic arteries (Rienhoff, 1951 and Berman *et al.*, 1951), portacaval shunting (Blakemore and Lord, 1945, and Linton, 1951), injection of sclerosing agents in the varices (Crafoord and Frenker, 1939, and Moersch, 1947), total gastrectomy (Wangensteen, 1945), esophagogastrectomy (Phemister and Humphreys, 1947), esophageal tamponade (Som and Garlock, 1947), coronary vein ligation (Grace, 1942), vagectomy, gastroenterostomy and ligature of the veins (Gray and Whitesell, 1950), direct attack on the bleeding varix (Crile, 1953, and Linton and Warren, 1953), and esophageal gastric resection with interposition of a jejunal segment and pyloroplasty (Merendino, 1955).

Currently, Linton (1955) believes that balloon tamponade should be utilized in patients with massive hemorrhage, followed by direct ligature of the bleeding varices. In such instances, however, Hamilton (1955) and Crile (1955) have had limited benefit with a somewhat similar approach. Subsequent to control of the bleeding Linton advocates a shunt operation or other definite therapy.

Rousselot (1955) is of the opinion that in patients with nonemergent recurrent bleeding portal venography should be employed to establish the extent of the varices and collateral feeders. A shunt procedure, esophagogastrectomy, or jejunal interposition may be indicated by the findings. Brick and Palmer (1955) have stated that varices should be removed as a prophylactic measure.

According to Nachlas *et al.* (1955) the severity of hemorrhage and evidences of hepatic failure are the best indices to survival.

At present the mortality figures have a limited meaning in the attempt to establish relative values of operative procedures because of the general paucity of cases and the differences in the gravity of bleeding. Generally, the prime causes of death are bleeding during surgery, rebleeding after surgery, and hepatic coma. Concurrent ascites is a grave prognostic sign.

HEPATIC COMA

At the moment, hepatic insufficiency and the resultant hepatic coma are prime barriers to the successful application of surgery to patients with complications of cirrhosis. Even the most innocuous of surgical procedures can be fraught with danger for these extremely debilitated patients. Considerable attention is being devoted to this problem with the hope of improving surgical results. It has been demonstrated by Butt (1953) and Foulk *et al.* (1955) that hemorrhage frequently is the factor preceding coma. According to Butt (1953), McDermott and Adams (1954), and McDermott *et al.* (1955) disturbances in ammonia metabolism with elevation of the blood ammonia account for the general toxicity. In the cirrhotic patient and in the presence of liver damage, detoxification of ammonia may be difficult, while hemorrhage into the gastrointestinal tract contributes to the elevation of blood ammonia.

Walshe (1953), too, has indicated that disordered amino acid metabolism may contribute to the coma, and in his concept glutamic acid has a key role. To combat the disturbance in metabolism, Walshe has attempted the intravenous use of glutamic acid. Currently Pearlman (1955) has also shown beneficial results from intravenous infusion of monosodium glutamate solution, and oral use of this drug and glutamic

acid. Kiley *et al.* (1955) indicate that hemodialysis may be helpful in temporarily lowering the blood ammonia levels.

McDermott *et al.* (1954) have suggested eliminating the sources of ammonia and contributing to removal of this substance. Specific medical measures include the use of intestinal antibiotics to reduce urease activity of the intestinal bacteria, a high carbohydrate diet to allow the brain to synthesize glutamine from glutamic acid, the use of glutamic acid, and the intravenous administration of succinate to aid the liver in urea formation. Surgical intervention to reduce gastrointestinal hemorrhage is advocated. Cincotti (1955) has indicated, too, that banked blood may contain considerable ammonia and that this may be partially controlled by the addition of a preservative—sodium glutamate mixture.

SUMMARY AND CONCLUSIONS

To recapitulate, from available evidence hepatic tissue is vascularized by both the portal venous and hepatic arterial circuits in a selective manner with some communication existing between these systems. Limited shunting of the blood may possibly occur to the hepatic venous tree. Of surgical importance in cirrhosis has been the realization of the nature of the hepatic vascular disturbance present in the disease. This is chiefly apparent as compression of the hepatic veins and increased shunting of the blood around the liver substance. Of importance, too, is the renewed concern with the regenerated hepatic nodule, its blood supply, and its possible compression effects on the adjacent hepatic veins.

Considerable physiologic study has been devoted to the effects of alteration of the extrahepatic vasculature in both the normal and cirrhotic liver. Various attempts have been made to reduce ascites by such means, and to depress the portal venous tension in this symptom and in bleeding varices. Ligation of the hepatic artery and portacaval shunting are currently of greatest interest in this regard. However, these procedures reduce the hepatic blood flow in accord with the extent and type of shunting or arterial ligature. Within limits they are compatible with human life, particularly with the use of antibiotics, but they will not promote liver regeneration and generally they add to hepatic insufficiency. To improve liver function systemic arterioportal venous shunts have been proposed and are being studied in the laboratory. New approaches to the problem of ascites, utilizing intestinal resection or the absorptive qualities of an everted flap of pedicled ileum mucosa, are also under investigation. Clinically, re-evaluation of instances of bleeding varices has indicated the frequent need for stemming massive hemorrhage by early direct attack on the varices or otherwise devascularizing the area.

From the accumulated data concerning hepatic cirrhosis it is apparent that progress is gradually being made in the surgical treatment of complications of this condition; however, surgery as yet has only been moderately successful in instances of uncontrolled bleeding varices and in selected cases of wasting ascites. Essentially, and even in these circumstances, treatment is medical for there is no surgical technique available at the moment to aid the underlying liver disease.

It is evident, too, that surgical progress must await methods of treating hepatic insufficiency for in these very debilitated people even simple procedures may be dangerous. Current studies regarding the metabolism of amino acids and ammonia in hepatic coma are therefore of prime interest. Thought must also be directed toward surgical means of aiding liver regeneration and controlling nodular cirrhotic growth, as well as the development of life-saving emergency measures. If advances along these lines can be made, surgery will move considerably beyond its present limited and controversial place in the treatment of this disease.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

The Traumatic Bone Cyst. MAX H. JACOBS. *Oral Surg.*, 1955, 8: 940.

THE AUTHOR presents 5 cases of traumatic bone cysts and discusses the etiology and treatment of the condition. He makes a strong point of emphasizing the presence of a cystic membrane consisting of fine connective tissue elements. This he removed in each case, not as a complete entity that could be enucleated, but as fine threads.

An interesting lesion that must be excluded in the differential diagnosis is a mandibular embryonic defect. This consists of a recess in the lingual surface of the mandible in which a lobe of the submaxillary gland is lodged. These lesions are easily mistaken for traumatic bone cysts—the important point is that they appear below the inferior alveolar canal, and the traumatic bone cyst appears above.

He agrees with Pommer's views that the cause of the cysts is trauma sufficient to create a focus of intramedullary hemorrhage which becomes encapsulated. In the young the bones are plastic and the vascular sinusoids are much wider than in the adult. The bleeding sets up a mild aseptic inflammation locally, in which the hydrogen ion concentration has been increased. It is stated that the white blood cells and the marrow tissue cells liberate proteases which are instrumental in instituting osteolysis, the amount being modified by the hydrogen ion concentration. Bone loss continues until active liberation of the proteases has ceased. In the meantime the cavity becomes lined with a very fine connective tissue membrane, the cells of which differentiate into osteoblasts from which bone regeneration takes place when the pressure in the cavity has been altered.

In conclusion it is added that the presence of vital teeth, absence of objective and subjective symptoms, and an ill-defined, circumferential area of sclerotic bone should raise the question of the possibility of traumatic bone cyst. —*F. W. Pirruccello, M.D.*

Progressive Bone Cavities of the Mandible; a Review of the So-Called Traumatic Bone Cyst and a Report of 3 Cases. JOHN G. WHINERY. *Oral Surg.*, 1955, 8: 903.

THE AUTHOR discusses the possible etiology of the so-called traumatic cyst of the mandible, following which he presents three case reports.

A discussion of the current theories concerning the etiology of these cysts is presented. The author is of the opinion that the true etiology is unknown. The traumatic-hemorrhagic theory, and other theories which he discusses, fail in his opinion to explain adequately the origin and the development of these cystic lesions. He adds: "It would seem wise, in view of this fact, to discontinue the use of the term traumatic cyst. It would seem more logical to name the lesion on the basis of its well established characteristics than for an unproved theory pathogenesis." The term progressive bone cavity is suggested.

The phenomenon of bone cavitation is similar to the resorption of bone in modeling resorption. An ungoverned modeling resorption occurring with the bone marrow is actually what occurs. It has been suggested that the force behind this internal modeling resorption might be a localized congenital potential for resorption.

The 3 cases of traumatic bone cysts presented occurred in children. All were evacuated surgically with excellent healing and without recurrence.

—*F. W. Pirruccello, M.D.*

EYE

Epithelial Tumors of the Eyelids. ALBERT G. SMITH and JOHN L. BROCKMAN. *Am. J. Ophth.*, 1955, 40: 522.

THE AUTHORS review the histologic and clinical aspects of a series of 82 epithelial tumors of the eyelids with a view toward obtaining a basis for approval or criticism of the terms applied to these tumors in the past.

The tumors were classified according to the degree of involvement (minimal, moderate, or extensive), the histologic type (basal-celled carcinoma, squamous-celled carcinoma, meibomian-gland carcinoma, unclassified glandular epithelioma, and an unspecified basal-celled group), the type of treatment received, and the prognosis.

It is suggested that the terms "mixed" epitheliomas, "mixed basosquamous epitheliomas" and "adenocystic" tumors be used rarely for epitheliomas of the eyelids and then only with clear definitions. This suggestion is made to avoid confusion, because in the past each term has been applied to several recognizable histologic entities.

It is also suggested that a "mixed" basosquamous cell epithelioma should be classified as either a basal

or a squamous-celled carcinoma, in accord with the more significant histologic pattern and probable clinical course. Avoidance of the term "adenocystic" is recommended because its use is not at present accepted as representing any single histologic entity.

—Joshua Zuckerman, M.D.

Permanent Bilateral Blindness Following the Use of Hexamethonium Chloride. GORDON M. BRUCE. *Arch. Ophth.*, Chic., 1955, 54: 422.

HEXAMETHONIUM BLOCKS both the sympathetic and parasympathetic ganglia, and its ocular effects include mydriasis, cycloplegia, and a variable fall in the intraocular pressure. The following incident illustrates the dangerous effect that its administration may occasionally have on vision. A 34 year old negro woman who was suffering from high blood pressure and anemia (blood pressure—240/136; red blood count—2,370,000) was given 6 mgm. of hexamethonium chloride intramuscularly. Four minutes later, when the blood pressure reading was 180/110, the patient noted blurred vision and a few minutes later reported blindness. Examination then revealed that vision was reduced to the perception of light in the right eye and to no perception of light in the left eye. The pupils were widely dilated. The ophthalmoscope showed greatly narrowed arteries, some edema about the discs, an occasional cotton-wool patch, and a few hemorrhages. The vision never returned. A week later examination disclosed temporal pallor of the discs and well defined fan figures at the maculae. Subsequently the discs went on to complete atrophy and the posterior poles became disorganized by extensive hemorrhage and exudate. *—James E. Lebensohn, M.D.*

Concerning the Pathogenesis of Retinal Holes. BERTHA A. KLIEN. *Am. J. Ophth.*, 1955, 40: 515.

THE AUTHOR attempts to illuminate some of the newer concepts of the pathogenesis of retinal holes by presenting their clinical and histologic features. Three different varieties of retinal holes are illustrated and described:

1. Those holes which formed in relation to but not at the actual site of a vitreoretinal adhesion. This was effected by traction from the adhesion upon a point of lowered resistance of degenerated retina at some distance away.

2. Those holes which formed at the actual site of vitreoretinal adhesions. This was effected by the tearing out of an operculum. If a fortified vitreous band or the operculum remains in contact with the margin of the hole, rents may be added to these two kinds of holes.

3. Those holes which occurred through traction from shrinking preretinal membranes in areas at which contact between the retina and the vitreous had been absent for a prolonged period of time. This was found near star folds and especially at the fovea centralis.

Fibrous or glial membranes representing the residua of endogenous or postoperative inflammation may fortify vitreoretinal adhesions.

In 1 of the cases a star fold could be demonstrated histologically even 3 months after the onset of the retinal separation. *—Joshua Zuckerman, M.D.*

The Diagnosis of Malignant Melanoma by Subretinal Fluid Studies. LEONARD CHRISTENSEN and GERALD E. ROWEN. *Arch. Ophth.*, Chic., 1955, 54: 477.

THE OBJECTIVE of this study was to determine the frequency with which free floating tumor cells appear in the subretinal fluid, the ease with which they can be recognized, and the possible dangers involved in this diagnostic procedure.

In 45 of 83 specimens of malignant melanoma examined, the subretinal coagulum contained tumor cells. The spindle cell types A and B showed a lesser tendency to shed cells than the epithelioid types. Melanoma cells were identified in 3 of 4 cases in which subretinal fluid was obtained for diagnostic purposes. There is great difficulty in differentiating tumor cells from histiocytes and macrophages. Three specimens of malignant melanoma in which penetrating diathermy had been applied either as a treatment for retinal detachment or for removal of subretinal fluid showed extraocular extension of the growth; the shortest time intervening between the diathermy coagulation and the enucleation was 13 days. In 1 case in which surface diathermy was applied without penetrating the sclera a year prior to enucleation, no extraocular extension was found.

The study thus shows that there is a high incidence of free-floating tumor cells in the subretinal fluid of eyes with malignant melanoma. While these cells may be recovered and identified by aspiration, the diagnostic differentiation of these cells is difficult, and the procedure carries with it the risk of extraocular extension of unrecognized tumors.

—Ray Karchmer Daily, M.D.

The Complete Removal of Gliomas Affecting the Optic Nerve. J. GRAFTON LOVE, HENRY W. DODGE, JR., and HUGO L. BAIR. *Arch. Ophth.*, Chic., 1955, 54: 386.

GLIOMAS, or so-called low grade astrocytomas, affecting the optic nerves have for some years been of great interest to ophthalmologists and ophthalmic surgeons.

The authors say that reflection on the subject, however, and a review of the writings of others make it evident that the prognosis in cases of glioma of the optic nerve depends on the extent and type of growth. Obviously, a tumor involving the optic chiasm or the neighboring structures of the hypothalamus and third ventricle, or one which involves the optic chiasm and both nerves, is a lesion which offers an undeniably gloomy outlook both for the maintenance of useful vision and for the preservation of life over a long period. On the other hand, in the cases in which the tumors are located primarily within the orbital part of the optic nerve or have some intracranial extension which is entirely prechiasmal, a much more favorable prognosis is indicated by reports in the literature and the experience of the authors.

The large majority of these tumors encountered are of low grade malignancy and therefore of a very slow-growing nature. They do not invade the surrounding tissues and seem to extend centrally by propagation along the optic nerve.

Since, pathologically, it seems uncommon for the glioma of the optic nerve to invade the orbital tissue or to invade the optic disc, the problem concerning sacrifice of the globe and orbital exenteration arises. The

authors append reports on 4 patients who had glioma of an optic nerve. By utilization of the transcranial approach to the orbit and nerve, they resected completely the involved nerve distal to the optic chiasm on the same side and proximal to the ocular globe, thus removing the tumor in toto and sparing the ocular globe on the involved side.

The authors suggest that all patients suspected of harboring a tumor affecting the optic nerve be given the benefit of exploration, and that radical removal of the offending tumor be carried out in the cases in which it is feasible. They say that knowledge of the pathologic processes has made them extremely reluctant to advise removal of the ocular globe or orbital exenteration, since it may be possible to retain the eyeball and oculomotor function and thus have a better cosmetic result.

The Experimental Ocular Effects of High Voltage Radiation from the Betatron. ALBERT C. BIEGEL. *Arch. Ophth.*, Chic., 1955, 54: 392.

HIGH VOLTAGE ionizing radiation with the betatron produces changes in the rabbit eye similar to those described for lower voltages. No marked difference in the ocular effects was noted for the electron and the x-ray beams. Portal size also had no appreciable influence upon the results. With low doses (225 to 900 roentgens) the first lens changes (punctuate opacities about the posterior horizontal suture) were noted after 3 to 6 months. With 1,800 roentgens the initial changes were usually equatorial and mature cataracts developed in some eyes after 4 months. The appearance of cortical vacuoles was accompanied by the histologic picture of balloon cells. These originate from equatorial fibers affected by radiation and migrate to the poles with the growth of the lens.

The irradiated rabbit eye displays two types of inflammatory response: first, an immediate and transient uveitis and then, a delayed keratitis with anterior segment reaction. After high dosage irradiation, cells resembling conjunctival goblet cells were noted in the corneal epithelium. Conjunctival hyperemia was a common early finding even with low doses. Epilation was rarely noted following doses of 900 roentgens or less, but with 1,800 roentgens it appeared after 2 weeks to 3 months. —*James E. Lebensohn, M.D.*

Reparation of the Fetal Eye Following Radiation Insult. ROBERTS RUGH and JOAN WOLFF. *Arch. Ophth.*, Chic., 1955, 54: 351.

THE RADIOSENSITIVITY of the developing eye has been established by several investigators. Recently Hicks reported that complete or nearly complete repair can occur in many zones of the retina.

This article comprises a review of the literature and a report of an investigation on the fetal eyes of mice at 12.5 days of gestation, at a time when the presumptive retina contains no mature neurones but is made up of abundant neuroectoderm cells which are in the process of proliferation and differentiation into neuroblasts, in anticipation of further differentiation into neurones.

The eyes were exposed to various intensities of x-ray irradiation, and were examined at various time intervals, from 4 hours to 6 days. In this manner it was possible to determine the rapidity of radionecrosis and the rate of retinal repair.

The data substantiate the thesis of Hicks that the fetal eye, radiosensitive as it is to x-ray damage at 12.5 days of gestation, can repair and reconstitute the retina so that it becomes functional in the adult mouse. All irradiated fetal eyes at 12.5 days exposed to any level of radiation, appeared to be fully repaired, or the retina was reconstituted by 72 hours after exposure. Exposed to high intensities of radiation there was persistent damage in the form of microophthalmia. —*Ray Karchmer Daily, M.D.*

The Problem of Orbital Implants After Enucleation. H. ARRUGA. *Brit. J. Ophth.*, 1955, 39: 599.

THE AUTHOR discusses the problem of orbital implants after enucleation.

The objective is to obtain an implant which will yield good prosthetic mobility.

He originally used a three-quarter sphere plastic implant with tunnels through which the four recti were drawn and sutured. The implant was completely buried and had no peg attached to it. Later, he added a peg to his own implant and employed the Moura-Brazil method of conjunctival suture. The result was an acrylic implant which consisted of three-quarters or two-fifths of a sphere of from 16 to 18 mm. in diameter with one or two noncorrosible metal pegs 1 mm. thick and 7 mm. long projecting from the upper part of its anterior surface.

The operation is performed in the following manner:

The conjunctiva and episclera are dissected posteriorly as far as the insertions of the recti tendons. A suture is passed through each tendon which is then divided close to its insertion. After the eyeball is excised the implant is introduced with two pegs protruding forward from its upper surface. First the superior and inferior tendons, then the medial and lateral tendons, are passed through the tunnels of the implant and sutured together. For greater security a separate additional suture is passed through all four tendons. The conjunctiva and Tenon's capsule are sutured so that the pegs are buried but not included in the wound.

An acrylic prosthesis is fitted 2 or 3 months after the operation, but if the position of the pegs changes or (as in most cases) if the orbital contents retract a new prosthesis is necessary.

The mobility of the prosthesis is generally 50 to 70 per cent of the normal horizontally and 40 to 60 per cent of the normal vertically.

The technique was later modified to leave a scleral ring in which the tendons of the four rectus muscles remained inserted. After the conjunctiva is dissected from the limbus almost as far as the equator and the cornea is excised the contents of the eye are exenterated. The sclera is cut all around to form a scleral ring extending from the limbus to the equator, to which the insertions of the four rectus muscles remain attached. The remainder of the sclera is then pulled outward and the obliques muscles and the optic nerve are cut. The implant is introduced into the scleral ring between the lateral and inferior recti. Two small holes are made in the borders of the limbus through which two pegs are passed. The conjunctiva and

Tenon's capsule are sutured to cover the pegs. The sutures are removed a week later.

A differently shaped acrylic implant is used in this operation. It consists of three-fourths of a sphere 18 mm. in diameter with two 7 mm. pegs about 10 mm. apart.

There are no buried sutures and no corners where blood might collect to become a focus of infection. However, this method cannot be used in cases of sarcoma of the choroid. —*Joshua Zuckerman, M.D.*

MOUTH

The Relationship of Senile Elastosis to Actinic Radiation and to Squamous Cell Carcinoma of the Lip; Further Investigation of 835 Cases. JOSEPH L. BERNIER and MARDELLE CLARK REYNOLDS. *Mil. Med.*, 1955, 117: 209.

IN 1951 BERNIER and CLARK published a critical statistical and morphological analysis of 835 cases of squamous cell carcinoma of the lip. This article concerns itself with the possibility that actinic radiation is a possible etiologic factor in the condition and that senile elastosis found in 640 of the carcinomas may be related to the actinic radiation.

It appears that senile elastosis is only in part associated with chronologic age, since a high percentage of the patients under 30 years of age (77%) had senile elastosis.

Patients with secondary diagnosis of leukoplakia, scar tissue, or evidence of damage from therapeutic radiation appeared no more likely to have senile elastosis than did patients without these diagnoses. Therapeutic radiation was administered infrequently and appeared unrelated to senile elastosis.

Among patients with no prior treatment and no detected metastases, there were relatively more recurrences after initial therapy in the group without than with senile elastosis.

Tabulation of the civilian occupations of World War II patients in their series showed that 69 per cent were in outdoor work, as compared with only 27 per cent of all Army inductees and enlistees. The percentages of the patients with and without senile elastosis were approximately the same for the outdoor and indoor workers.

The senile elastosis did not appear to be related to complexion of the soldiers, since it was found in the same percentage of the patients with fair or ruddy complexions as in those with medium or dark complexions.

Approximately the same percentages of the patients with carcinomas on the upper as on the lower lip had senile elastosis.

Forty-five per cent of the 611 patients for whom the state of birth was known, 45 per cent of those with senile elastosis, and 47 per cent of the group without senile elastosis were born in 8 states. Only 2 of these states were wholly or partly above the fortieth parallel.

States of residence below 40 degrees' latitude accounted for 70 per cent of the 453 World War II soldiers with senile elastosis for whom this information was available. These same states contributed only 42 per cent of all men inducted or enlisted during World War II. There was no evidence that senile elastosis was related to residence above or below the fortieth parallel.

Similarly, there was no evidence that the World War II patients for whom both the areas of birth and residence were below or above the fortieth parallel differed with respect to the presence of senile elastosis, nor did a change of residence from above to below the parallel or vice versa.

From this study one might conclude that although the senile elastosis is in part associated with chronologic age, it involves some factors other than the chronologic aging. No statistical evidence could be found to show association of senile elastosis with actinic radiation, other than that previously found for the carcinomas of the lip. The question remains as to whether the senile elastosis is actually a pathologic condition resulting from the carcinoma, or whether the senile elastosis may have been a localized aging mechanism which preceded the carcinomas.

—*F. W. Pirruccello, M.D.*

PHARYNX

Juvenile Fibromas of the Nasopharynx. JOHN B. ERICH. *Arch. Otolar.*, Chic., 1955, 62: 277.

JUVENILE nasopharyngeal fibromas are rare and benign. However, they produce alarming symptoms and present serious problems in treatment. Injudicious surgical or radiologic treatment of such lesions can cause frightening hemorrhages, intracranial disturbances, and even death. The mere removal of a small piece of tissue from this type of lesion for microscopic examination occasionally can produce bleeding so profuse that ligation of the external carotid artery and the administration of blood are necessary.

Nasopharyngeal fibromas are not malignant; they never metastasize and do not infiltrate tissues. However, they are highly destructive lesions because of their ability to cause pressure necrosis of bone and to send out processes of tumor tissue that may invade one or both nasal cavities, and, in turn, the accessory sinuses. They are reddish, firm tumors almost cartilaginous in consistency. They are rounded or slightly nodular, and are covered with normal mucous membrane. Ulceration seldom is present unless the lesions have been traumatized.

When any question arises concerning the diagnosis, biopsy should be performed; otherwise, it is better avoided. Under no circumstances should an attempt be made, as an office procedure, to secure a specimen for biopsy from a lesion suspected of being a juvenile fibroma. Intratracheal anesthesia and hospital facilities are essential, and the surgeon should be prepared to ligate one or even both external carotid arteries, if necessary.

Six types of therapy may be considered: sex hormones, sharp excision, electrocoagulation, external irradiation, radium needles, and radon seeds. The author stated the opinion that interstitial irradiation is the most expedient method of treating juvenile fibromas of the nasopharynx. He does not favor the use of radium needles, however, simply because many of these tumors are so soft and friable that radium needles inserted in them often become dislodged by

movements of the tongue and pharynx. In his opinion radon seeds offer the most effective form of therapy for patients who have nasopharyngeal fibromas. For no patient whom he has treated by interstitial irradiation with radon seeds has ligation of the external carotid artery been required, and no patient has had any serious difficulties.

NECK

Radioactive Iodine or Surgery in the Treatment of Hyperthyroidism. DWIGHT E. CLARK and JAMES H. RULE. *J. Am. M. Ass.*, 1955, 159: 995.

THE AUTHORS' CRITERIA for the use of radioiodine (I^{131}) in the treatment of hyperthyroidism are as follows: uncomplicated hyperthyroidism in patients more than 40 years of age, recurrent or persistent hyperthyroidism following thyroidectomy, hyperthyroidism complicated by some other disease, idiosyncrasies to antithyroid drugs, refusal to accept surgical therapy, or severe exophthalmos. Contraindications for I^{131} therapy are as follows: uncomplicated hyperthyroidism in patients under 40 years of age, hyperthyroidism in children, large toxic nodular goiter, hyperthyroidism complicated by pregnancy and lactation, hyperthyroidism associated with a clinical solitary nodule, nontoxic nodular goiter, or nontoxic diffuse or simple goiter.

Of 628 hyperthyroid patients treated with I^{131}, 520 (82.8%) became euthyroid. A total of 108 (17.2%) developed varying degrees of hypometabolism. Complete remissions were obtained in 81.6 per cent of the 628 patients with one or two doses of I^{131}. The results indicate that radioiodine therapy has certain advantages over surgery in selected cases of thyrotoxicosis.

—*Ely Elliott Lazarus, M.D.*

The Indications and Technique for Cervical Lymph Node Resection. ALTON OCHSNER. *Ann. Otol. Rhinol.*, 1955, 64: 728.

BECAUSE of the rich lymphatic drainage from the oral cavity, lymph node involvement from lesions in the buccal cavity is extremely likely. Although most tumors of the buccal cavity usually remain localized in the nodes indefinitely when they metastasize to the cervical nodes, there are two types of tumors in which widespread metastases are likely to occur. These are the transitional carcinomas and the lymphoepitheliomas which are found at the base of the tongue and in the region of the tonsils.

There is no uniformity of opinion concerning the advisability of performing prophylactic lymph node dissection. It is the author's opinion that prophylactic node dissection is necessary in many cases, but unnecessary in cancer of the lip unless the lesion is greater than 3 cm. in size or is highly malignant.

The indications for cervical lymph node dissection are dependent upon a number of factors. Lymph node dissection is not indicated unless the primary lesion has been cured. The author emphasizes the fact that all lymph node enlargement is not necessarily carcinomatous spread; it might be inflammatory enlargement.

Cancer of the lip is the most frequent cancer involving the buccal cavity (25 to 30%). The lymph nodes which are likely to be involved in this lesion vary according to the location of the tumor. The lymph nodes involved in drainage of the lower lip are principally the submaxillary, mental, and submental glands. Carcinoma of the upper lip involves the preauricular, infraparotid, submaxillary, submental, and deep cervical chain.

In contradistinction to the lower lip, a malignant lesion of the upper lip is frequently associated with widespread lymph node involvement. A unilateral suprahyoid resection is indicated if the lesion is located on the lateral part of the lip. A bilateral suprahyoid resection is done for lesions in the midline. In the presence of suprahyoid involvement, a unilateral radical neck dissection on the involved side is done, or a bilateral dissection at different stages if the lesion is near the midline.

Carcinoma of the gingiva is usually a relatively benign lesion. When it involves the lower gingiva it is likely to be associated with metastases much more frequently than when it involves the upper gingiva. Carcinoma of the lower gingiva, unless the lesion is small and superficial, should be treated with en bloc excision of the lesion and the adjacent mandible, and a radical neck dissection on the homolateral side. Carcinoma of the upper gingiva should be treated adequately with wide excision of the local lesion and homolateral radical neck dissection if palpable nodes are present.

Carcinoma of the tongue is more frequent in women than other carcinomas of the mouth. Although it occurs less frequently than carcinoma of the cheeks, lips, and lower gingiva, lymph node metastases occur much more frequently. This is due probably to the extreme mobility of the tongue, the very rich lymphatic drainage, and the fact that the drainage is bilateral. Lesions of the anterior two-thirds of the tongue are generally epidermoid. Approximately 20 per cent of lesions of the base of the tongue are transitional cell carcinomas or lymphoepitheliomas.

Because of the immediate attachment of the tongue to the floor of the mouth, lesions of the tongue can be considered together with those of the floor of the mouth. A lesion of the tip of the tongue can be treated by wide excision followed by bilateral suprahyoid dissection, with unilateral neck dissection if more on one side. The treatment of cancer of the lateral border of the tongue and involvement of the floor of the mouth consists of irradiation followed by en bloc excision and radical neck dissection on that side or a radical en bloc hemiglossectomy and cervical bloc dissection. The treatment of cancer of the inferior surface of the tongue with involvement of the floor of the mouth consists of radical en bloc excision of the tongue lesion, the floor of the mouth, the adjacent mandible, and all the cervical nodes. If the lesion is near the midline, the same procedure must be done, but later radical neck dissection should be done on the opposite side. The treatment of carcinoma of the base of the tongue consists of irradiation followed by radical neck dissection on the homolateral side and bilateral radical neck dissection if the lesion is near the midline.

Carcinoma of the soft palate is a rare condition. It is associated with metastases and lymph node in-

volvement, and the prognosis is very grave. If complete eradication of the local lesion can be accomplished, a bilateral radical neck resection should be performed.

Cancer of the buccal mucosa of the cheeks is a relatively benign lesion. Except when it is located posteriorly near the angle of the jaw, local treatment should consist of irradiation and unilateral radical lymph node dissection.

Cancer of the tonsil is a frequent lesion, representing 10 per cent of all buccal cancers. Malignant lesions of the tonsil are usually lymphoepitheliomas, transitional cell carcinomas, or lymphosarcomas. One-third of the lymphoepitheliomas and lymphosarcomas occur in women. Squamous cell carcinomas are extremely rare. Lymph node involvement is frequent and early and may be the first clinical manifestation. This is due to the rich lymphatic drainage of the tonsil, the fact that there is bilateral lymph drainage and the lesions are highly malignant. The nodes which are usually involved are the superior deep cervical nodes, the deep cervical chains, and the subparotid nodes. The treatment consists first of irradiation, which should be done intensively, and, if the lesion is a lymphosarcoma, usually good palliative results will be obtained. However, at the present time, there is an increasing tendency to do combined operations which consist of an en bloc excision of the original lesion and unilateral neck dissection after irradiation of the primary lesion has been done. In this way, the primary lesion is shrunken and the operation can be done much more satisfactorily. If the lesion is close to the mandible, it is necessary to resect that portion of the mandible. On the other hand, the mandible may be divided and subsequently sutured in order to complete the operation.

Cancer of the pharynx is usually a highly malignant tumor and may be either epithelial or mesothelial in origin. Lymph node involvement is early, and spread is to the superior deep cervical, subparotid, and deep cervical chain. Treatment consists of intensive radiation, lymph node dissection seldom being indicated. —*Ely Elliott Lazarus, M.D.*

Postcricoid Carcinoma as a Sequel to Radiotherapy for Laryngeal Carcinoma. MAX L. SOM and RALPH PEIMER. *Arch. Otolar.*, Chic., 1955, 62: 428.

IT IS KNOWN that mucosal malignant growths have occurred following radiation for thyroid and tuberculous disease. Therefore, the authors postulate that a postcricoid lesion occurring locally 17 years after irradiation is probably not a recurrence of the initial carcinoma, but is rather a late sequela of radiotherapy. —*Ely Elliott Lazarus, M.D.*

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Analysis and Management of Severe Concealed Brain Injuries (Klinik und Behandlung der schweren gedeckten Hirnverletzungen). H. W. Pia. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 623.

This discussion concerns the severe, concealed brain injuries occurring in a group of 1,790 patients who underwent craniocerebral trauma. The severe form comprised approximately one-third of the entire group of cases. In this type of case the following questions arise: (1) Are localizing symptoms present and are these a manifestation of contusion or of a space-occupying hemorrhage? (2) Of what type and extent are the generalizing signs? (3) Are there associated injuries and have they an influence on the cerebral process? These severe injuries are considered with respect to the significance of fracture, contusion, and hematoma, respectively.

Since the degree of brain damage accompanying fracture determines the prognosis, evaluation depends on the recognition of contusion and hemorrhage. The mortality of severe craniocerebral injuries is extremely high (in this series about 60 per cent), and is primarily dependent on the extent of brain stem damage. The choice between conservative and operative management depends upon the differentiation of patients with primary and irreversible damage from those with reversible brain stem involvement. Signs indicating irreversible brain stem injury are those of functional decerebration, that is, cerebral rigidity with extensor convulsions. Another syndrome indicating irreversible damage is deep coma with central hyperthermia, lung edema, tachypnea, tachycardia, and fall in the blood pressure. When these signs appear no method of treatment is of avail and surgery is contraindicated. If, however, the central functions are intact (continuous control is indispensable) and distinct lateralizing signs, paralysis, convulsions, anisocoria with impairment of the pupillary reaction, or secondary loss of consciousness develop, operation is indicated before irreversible brain stem damage occurs.

Management is directed against 2 cardinal conditions: (1) increased intracranial pressure from space-occupying hemorrhage, brain swelling, and brain edema; and (2) oxygen exchange. In addition to direct surgical attack, tracheotomy is of value in the unconscious patient. Conservative measures include the treatment of shock, for which blood transfusion is the treatment of choice. The value of phenothiazine has not yet been demonstrated. Therapeutic spinal drainage is to be avoided. Dehydration is not without danger, especially in the presence of circulatory disturbance. Controlled hypothermia has not fulfilled expectations. Physical cooling appeared to be more effective than chemical cooling. Ganglion blockade appeared to be the most efficacious means of combating circulatory disturbance and increased intracranial pressure. —*John L. Lindquist, M.D.*

A Roentgenographic Study of the Variations in the Normal Anterior Cerebral Artery; 100 Cases Studied in the Lateral Plane. Arthur A. Morris and Clemmer M. Peck. *Am. J. Roentg.*, 1955, 74: 818.

The authors review a series of cerebral angiograms with a view to studying the variations which occur in the normal anterior cerebral artery when viewed from the lateral projection. In 62 per cent of the 100 patients selected for study, simultaneous pneumoencephalography was done. It is believed that this combined type of procedure is of great value, and the authors have found that what may seem to be pathologic may be only a normal variant since there is such a tremendous amount of variation in the normal anterior cerebral artery as seen in the lateral projection.
—*Nicholas Wetzel, M.D.*

The Treatment of Intracranial Carotid Aneurysm by Extracranial Ligation. William F. Beswick, Irving Hyman, and William R. Kinkel. *N. York State J. M.*, 1955, 55: 2623.

Adequate treatment of intracranial aneurysm has been a constant subject of discussion among neurosurgeons for the last 15 years. In this series of 14 cases, the intracranial aneurysm was treated by ligation of the common carotid artery in 13 cases and by tying of the internal carotid artery in 1 case. Nine of the aneurysms were supraclinoid and 5 were subclinoid. Ophthalmoplegias were characteristic of aneurysm in 12 of the 14 cases; there was 1 case of third nerve paralysis, 10 cases of paralysis of the third and sixth nerves, and 1 case of complete internal and external ophthalmoplegia. In the last case the patient was almost blind. In 7 patients there was involvement of various parts of the trigeminal nerve. In the past the authors employed the Matas test for 15 to 20 minutes, but in recent years the Popper clamp has been used; partial occlusion of the common carotid artery was effected for from 10 to 24 hours, followed by complete occlusion for 4 to 6 hours.

Headache and sensory changes were relieved in from 1 to 2 weeks after ligation, while ophthalmoplegia subsided slowly after a period of from 1 week to 8 months.

In one case carotid compression produced contralateral neurologic signs during the testing period but finally the patient was able to tolerate complete digital compression of the artery for 30 minutes. Another patient tolerated the compression very well, but 13 days after ligation of the common carotid artery and 6 days after craniotomy a right hemiplegia developed. There remains a nondisabling hemiparesis. In still another case, because of a desperate situation, ligation of the common carotid artery was instituted without testing, and this was followed by complete and permanent hemiplegia. A recurrent subarachnoid hemorrhage developed 2 days after ligation of the common carotid in 1 case and intracranial trapping was found necessary. Only one patient died of an unrelated disease.

The follow-up period in these cases is relatively short, 12 of the patients having been treated between March, 1952 and March, 1955. The authors are gratified with the results, especially the subsidence of symptoms referable to the eyes.

—Adrien Ver Brugghen, M.D.

Roentgen Therapy of Brain Tumors with Special Reference to the Neuroectodermal Tumors (Roentgenstrahlenbehandlung bei Hirntumoren mit besonderer Hinsicht auf die neuroektodermalen Geschwuelste). Z. Zsebök. *Arch. Geschwulstforsch.*, 1955, 8: 246.

The author's material consisted of 101 neuroectodermal tumors treated by irradiation therapy at the First Surgical Clinic and the Neurosurgical Institute of the University of Budapest in Hungary, in the period from 1948 to 1952 (52 months). This material comprised a part of 168 inoperable brain tumors which were treated by roentgen irradiation.

The series of neuroectodermal tumors are broken down into 30 astrocytomas, 24 glioblastomas, 10 ependymomas, 2 medulloblastomas, and 35 other brain tumors of various types (cysts, oligodendrogliomas, atypical gliomas, papillomas, and pinealomas).

In the radiation therapy a simple fractionated method was used, approximately 4,000 roentgens being given to the lesion through 0.95 mm. of copper as filter. As a rule, the irradiation was repeated after 3 to 6 months. Since the dosage applied to the skin field (this field never exceeded 48 sq. cm.) renders it more sensitive to the rays, the subsequent series of irradiations were applied in smaller fractions (150 roentgens) for protracted periods. The dosages which were never schematically chosen but selected in consultation with the neurosurgeon and the neurologist have never exhibited the so-called "prereaction" described by Beclére. This absence of reaction may be explained by the fact that the therapy during the first 5 days began with a dose of 100 to 150 roentgens and was only raised to 200 roentgens per day in subsequent sessions.

Thus, with the various skin fields available a total dosage of more than 30,000 roentgens can be reached without injury of serious character to the skin or cranial bones. Of course, such enormous dosages will usually result in complete and permanent depilation and considerable pigmentation of the scalp. On the whole, the total dosage of irradiation ranged from 3,000 to 10,000 roentgens. The results of this therapy are given in a table which also shows the number of months of survival up to October 1, 1953. There were 3 especially successful cases, with survivals of 48, 43, and 36 months. The response of the otherwise hopeless patients to the irradiation treatment has been very favorable as an important number of these patients are still living and even able to resume their former occupations. *—John W. Brennan, M.D.*

Hypophysectomy in Man; Further Experiences in Severe Diabetes Mellitus. R. Luft, H. Olivecrona, D. Ikkos, T. Kornerup, and H. Ljunggren. *Brit. M. J.*, 1955, 2: 752.

The treatment of diabetes mellitus with insulin has prolonged life to the point where complications of the disease may lead to death from vascular disease. Blindness, renal insufficiency, or cerebral hemorrhage may occur. The anterior pituitary contains a diabetogenic hormone which may be a factor in vascular changes, and in the present series hypophysectomy was carried out to influence that factor. Twenty patients (10 males and 10 females), all with diabetic retinopathy, were operated upon during the period from November, 1951 to date.

It is impossible to summarize this very brief and concise article. There are, however, some salient points which may be touched upon. The mortality with the use of this procedure was as follows: 2 patients died in the first postoperative week; 2 others died within a month of vascular disease not specifically related to the operation; 1 patient died in an epileptic state, 4 weeks after operation, probably due to a resistant hypoglycemia; and 2 patients died at 15 and 19 months, respectively—one from renal insufficiency, the other in a hypertensive crisis.

In the postoperative management, cortisone only was used in substitution therapy and the insulin requirement was reduced to approximately one-third to one-fourth the preoperative levels. The cases were assessed with regard to the circulation, the eyes, and the function of the kidney. A fall in systolic pressure was noted after operation, the heart decreased in size, and capillary fragility was normal in the postoperative period. With regard to the kidney, a marked decrease in the filtration fraction was induced and albuminuria was decreased by the operation. Studies of the kidneys are supported by complicated tables, but the general conclusion was that there had been no signs of progression of diabetic renal disease in the follow-up period. No definite decision was reached as to whether actual improvement had been attained in the condition of the kidneys. With regard to the eyes, no progression of the diabetic retinopathy was observed in the follow-up period; on the contrary, improvement in visual acuity and/or eye ground changes were noted in most cases.

The short period of postoperative observation does not permit of any firm conclusions as to the value of hypophysectomy in arresting the vascular complications of diabetes, but the authors believe the results to be satisfactory.*—Adrien Ver Brugghen, M.D.*

The Late Results of Facial Nerve Repair. Robert C. Martin. *Ann. Otol. Rhinol.*, 1955, 64: 859.

The author states that many repairs of facial nerve injuries have been done since the report of Bunnell in 1927, and that these have been accomplished by various methods: (1) a decompression of the injured nerve, (2) hemolysis, or (3) a nerve graft. Numerous reports of the results of these procedures have appeared one to two years following surgery, but few long-term studies, from 18 to 26 years after operation, have appeared in the literature. He was able to find 6 patients who had been operated upon 18 to 26 years previously, by a neurolysis, an end-to-end anastomosis, or a nerve graft. The interval between injury and repair varied from 20 days to 2 years. Return of function varied from 30 days in the case of a neurolysis to 7 months in the case of a nerve graft. Recovery of facial tone was good in all types of repair and re-

mained so. Voluntary control was absent in the frontalis muscle, but good elsewhere. Associated movements occurred most frequently in nerve grafts and seemed to lessen as time went on. Emotional control was poor early, and fair as a late result. Contractures seemed to disappear in from 2 to 5 years; tics disappear in about the same length of time but may continue to occur under stress. Taste disturbances were not noted.

In summary, the author states that the main long-term improvement would seem to be a lessening of tics, disappearance of contractures, a lessening of associated movements, and some return of emotional control. —*Nicholas Wetzel, M.D.*

SPINAL CORD AND ITS COVERINGS

Discopathy and Cervical Osteophytosis; Clinical, Roentgenological, and Surgical Experience (Discopatie e osteofitosi cervicali; osservazioni cliniche, radiologiche, e chirurgiche). R. GRISONI, G. LOMBARDI, and G. MORELLO. *Chirurgia*, Milano, 1955, 9: 474.

TWENTY-FIVE operatively controlled instances of discopathy and cervical osteophytosis form the basis of this report.

The authors believe that the so-called narrowing of the space between the vertebral bodies (intervertebral space; intersomatic space), that is, the roentgenologically visible potential space which is filled by the intervertebral fibrocartilage, or disc, is not of great diagnostic importance. Many patients with proved disc protrusion or discal hernia do not exhibit any important narrowing, and in many other instances there is evident narrowing without either protrusion or hernia.

In the matter of myelography the authors take an affirmative view. The technique which they have been using consists of injecting by lumbar puncture not less than 7 c.c. of lipiodol with the patient secured to an adjustable table. In 23 of 24 patients in their material the myelography gave positive results. Myelography permits precise determination of the seat of the lesion in instances in which the roentgenogram of the spinal column and the clinical signs leave some doubt in the matter. Of course, in instances of osteophytosis, in which the spur is demonstrable roentgenologically, myelography may perhaps be omitted. The value of myelography may be inferred when one considers that the compressive action may be present contemporaneously at more than one level.

In the matter of surgery some distinction is made between the treatment of osteophytosis and that of disc protrusion. In the former, that is, the cervical osteophytosis, the operation is usually of a conservative nature; the technique consists of a simple laminectomy, or a laminectomy combined with a foraminotomy. Removal of the osteophyte is not insisted upon; perhaps the cord can be sufficiently relieved by the cutting of some of the attachments of the denticulate ligament.

In 13 of the 15 cases of vertebral osteophytosis, the results are known. Two patients were cured, 1 patient had marked amelioration of his symptoms, 3 patients had discrete amelioration, and 3 had light amelioration. In 3 instances there was no improvement and in 1 case the condition deteriorated.

In the instances of hernia or protrusion of the disc the lesion was systematically extirpated (in 1 case a foraminotomy was all that was attempted). One patient died on the second postoperative day of an extradural hematoma. One patient has been lost to view. The remaining 8 patients presented 2 complete cures, 4 marked ameliorations, and 2 with some improvement in their condition.

From the small number of observations it is, of course, impossible to conclude whether the operative method of treatment, particularly the more radical procedure, gives better results than the others. This much can be stated, however, the best results are obtained in the patients who are operated upon early. According to the authors' experience the critical period for the intervention lies within the first 12 months from the beginning of persistent disturbances.

—*John W. Brennan, M.D.*

PERIPHERAL NERVES

Repair of the Motor Branch of the Ulnar Nerve in the Palm. JOSEPH H. BOYES. *J. Bone Surg.*, 1955, 37-A: 920.

THE INTRINSIC MUSCLES of the hand are of paramount importance to all who perform highly skilled work with their hands. In civil practice, injury to the motor branch of the ulnar nerve in the palm is accomplished by sharp instruments. This may occur before or after the branches are given off to the hypothenar eminence. In the former, there is weakness and clawing; when the injury is in the palm there is loss of lateral motion of one or two digits and weakness of adduction of the thumb.

Ten cases are reported in which the motor branch of the nerve was injured and repaired, with satisfactory recovery of function in all. In some cases there was loss of substance of the nerve, which led to a gap. In order to close the defect, the author proposes an operative procedure in which the nerve is rerouted through the carpal tunnel. The volar carpal and the transverse carpal ligaments are divided to accomplish this and to provide end-to-end suture. The return of function, judged by the activity of the first dorsal interosseous muscle, varies from 3 to 14 months, depending primarily upon the point at which the nerve was interrupted by the injury.

The present article will be of special interest to those interested in surgery of the hand.

—*Adrien Ver Brugghen, M.D.*

MISCELLANEOUS

The Results of Splanchnicectomy on Patients with Hemorrhagic Hypertensive Retinitis. IONE HUNTINGTON and JAMES A. EVANS. *N. England J. M.*, 1955, 253: 398.

THE AUTHORS review a series of 206 patients who had hemorrhagic eye grounds and who, in the period between 1935 and 1949, underwent splanchnicectomy. These patients would be considered as having grade 3 or 4 hypertension according to the classification of Keith, Wagener, and Barker. Of this group of patients,

follow-up was obtained in all except 17 with follow-up periods ranging from 4 to 19 years. Most of the patients had the extensive dorsolumbar sympathectomy (fourth thoracic to second lumbar ganglion). In many of the patients sympathectomy was the only specific form of therapy but some patients have been placed on low sodium diets and 6 have been placed on the newer drugs.

Statistically reliable figures were calculated for the period of 10½ years although several patients have survived up to 19 years.

In the group of 147 patients with grade 3 hypertension, 3 died after operation, an operative mortality of 2 per cent. Of the 144 patients who survived surgery, 90 lived or are still living after 4 to 14½ years; 55 died in the 13-year interval. After 4½ years the cumulative survival was 72.8 per cent as compared with an expected cumulative survival of 22 per cent. At 6½ years, 61.9 per cent survived as compared to an expected survival of 10 per cent. At 8½ years there were 56.2 per cent of survivals as against none for the series of Keith, Wagener, and Barker, and at 10½ years the survival rate was 46 per cent for this series.

There were 42 patients with grade 4 hypertension and in this group there were 3 operative deaths (7.1%). One patient has already lived 14½ years. The survival rates of these patients were compared to the normal life expectancy according to life tables and a figure derived. For this group it was 43.2 per cent against an expected survival of 5.6 per cent at 5½ years; at 6½ years 39.9 per cent against 5.6 per cent; at 10½ years 33.4 per cent.

At the time of the last follow-up, 26 of 42 patients with grade 4 hypertension and 58 of 147 with grade 3 disease were dead—a total of 84 out of 189. Cardiac disease accounted for 8, cerebrovascular disease for 20, and uremia for 10 deaths.

Of 89 grade 3 patients, 66 felt well; 10 of these take some form of medication. In 60 patients the blood pressure fell to a satisfactory level. In 28 patients it did not, but many of these patients have been relieved of their symptoms. In 54 of the 89 the ocular fundi no longer show any hemorrhagic retinitis.

Sixteen patients with grade 4 disease survive; of these, 12 feel well and 2 take drugs. Thirteen obtained a satisfactory pressure response; 12 showed a disappearance of hemorrhages and papilledema.

Thirteen nonfatal and 20 fatal cerebrovascular accidents have occurred, which indicates that splanchnicectomy does not reverse cerebral atheroma.

In both groups, an ability to concentrate urine well seemed to offer the best prognosis, and studies of blood pressure lability as a criterion for operability have seemed of little value.

The authors state that they chose to study this group of patients because they felt that the development of hemorrhagic fundi was the best indication that the hypertension was entering the serious phase. The prognosis after splanchnicectomy is much more dependent upon the state of renal function than on the status of the ocular fundi. After an experience of 19 years with 1,200 splanchnicectomies, they have now abandoned the operation for grades 1 and 2 of hypertension except, in the latter, for those patients with hypertensive encephalopathy, enlarged hearts, or nocturnal orthopnea.

It is believed that with the advent of modern drug therapy, the indications for surgery have further diminished, but to exactly what extent is an unsettled question. The final evaluation of this problem will not be settled in the immediate future. However, in spite of the newer drugs splanchnicectomy is a valuable resort in patients with hemorrhagic fundi.

—*Nicholas Wetzel, M.D.*

SURGERY OF THE THORAX

CHEST WALL AND BREAST

The Spread of Mammary Carcinoma. PHILIP B. PRICE. *J. Am. M. Ass.*, 1955, 159: 1345.

THE AUTHOR discusses concepts of tumor embolization in carcinoma of the breast. He points out that tumor emboli are not synonymous with metastases as the emboli frequently die out. This concept is confirmed by animal experiments. The danger of transplantation of malignant cells at operation is stressed.

Serial section of lymph nodes in 30 cases of breast carcinoma previously reported as lymph node negative had shown carcinoma cells in approximately one-third of the cases. The author points out that gross spread of the carcinoma is frequently limited to the original site of the lesion, but actual spread, undetectable even by microscopic study, extends far beyond this. These findings help one to understand why classical mastectomy offers only 70 per cent 5 year clinical cure when the cancer is grossly and microscopically limited to the mammary gland.

—*Alan Thal, M.D.*

Double Carcinoma of the Breast (Das Doppelcarcinom der Brustdruese). H. BRUCK and W. LORBEK. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 281: 66.

DURING A 22 YEAR PERIOD 29 women and 1 man with double carcinoma of the breast received treatment at the Second Surgical Clinic of the University of Vienna.

In 22 of the 29 female patients a bilateral operation was performed, while in the remaining 7 the tumor was advanced too far to allow a radical operation.

In 20 of the 22 patients a follow up study could be done. In 12 a bilateral primary cancer was diagnosed, while in 8 the tumor in one breast was considered to be metastasis of the cancer in the other breast. In 6 of the 12 patients with 2 primary carcinomas, the histologic picture of both tumors was identical. In 6 of the second group of 8 patients, both tumors showed identical structures. It follows that histologic findings can offer only suggestions as to whether the second tumor is a primary lesion or a metastasis, but they cannot serve as conclusive evidence. Two primary carcinomas are diagnosed if tumors are found in each breast but no metastases are detectable, if the second tumor develops a long time after the first, and if within a year following the appearance of the second tumor no metastases can be found in any part of the body.

Histologically, bilateral carcinomas do not differ from unilateral formations. Solid and scirrhous types predominate in both groups. It is noteworthy, however, that adenocarcinoma was not found among the entire group of bilateral tumors.

Contrary to other statistics, the prognosis in women before the menopause was not poorer than in the older age group.

The prognosis of bilateral carcinoma of the breast is exceptionally grave. —*Joseph K. Narat, M.D.*

TRACHEA, LUNGS, AND PLEURA

Resection and Anastomosis of the Thoracic Portion of the Trachea for Cicatricial Stenosis (Resektion und Anastomose am thorakalen Teil der Trachea wegen narbiger Stenose). A. BIKFALVI and D. KASSAY. *Thoraxchirurgie*, 1955, 3: 150.

THE 32 YEAR OLD WOMAN had suffered for 15 years from dyspnea, mostly on occasions of severe bodily exertion. Three years ago there had developed a laryngitis and since then a frequent, raw coughing has persisted. During the last 2 years her sufferings had increased markedly.

At the time of the first examination the well developed and fairly well nourished, but pale and slightly cyanotic, patient showed inspiratory dyspnea with a loud stridulous sound. The chest was long and asthenic in appearance. Roentgenology uncovered some old calcified lesions, apparently of tuberculous origin. The area of stenosis was, of course, seen in the tracheoscope; however, it was by means of tomography that the most information was obtained.

By means of this method of roentgenologic examination it was found that the trachea at the level of the third dorsal vertebra was narrowed; on the right side the constricting mass of scar tissue was wedge-shaped and on the left side it was cushionlike. The tracheal stenosis began 7 cm. beneath the glottis; the tracheal lumen at this level measured approximately 1 cm. from front to back and 3 to 4 mm. from side to side. To the right of this portion of the trachea were some shadows suggesting enlarged lymph glands, and the shadow of a calcified lymph gland lay to the left. Areas of calcification were also observed beside the trachea above its bifurcation and along the main bronchi. In the midportion of the left main bronchus was a uniformly delineated narrowing.

The long history of the condition, leading back into childhood, the suggestion of healed lymph gland tuberculosis, and the scattered calcification processes led the authors to the conclusion that the bronchial stenotic process was the result of the cicatrization of a perforation into the bronchus of a caseated lymph gland.

Because of the suggestive tuberculous appearance of the entire process it was considered inadvisable to dilate or otherwise treat locally the stenotic process and a tranverse resection of the trachea was performed.

The operation was carried out under local anesthesia with the patient in a half-sitting position. The sternum was divided longitudinally and split transversely at the level of the third intercostal space. The two flaps thus produced were then spread apart, which opened up the left pleural cavity without in any manner influencing the quiet respiratory movements of the patient. The trachea, starting in the midline, was isolated from its cervical portion to a level beneath the points of off-branching of the innominate veins, but not loosened from the esophagus (to guard

the blood supply). At this stage of the operation the patient had difficulty in breathing, the blood was quite dark in color, and the bleeding was reduced in amount. A bronchoscope was introduced, the upper end of the stricture noted, and the trachea divided at this level; the condition of the patient had become critical. With the aid of a probe the lower end of the strictured area was determined and the trachea was again divided at this level. At this point the condition of the patient improved, the breathing became quiet and the cyanosis decreased in intensity.

The excised portion of the trachea included the width of two tracheal cartilages (12 mm). The distance between the upper and lower tracheal stump ends was now 6 cm., and would certainly have been greater except for the undisturbed attachment to the esophagus. The circular anastomosis of the tracheal stump ends was carried out with 20 interrupted sutures. This could be accomplished without tension on the suture line by the anterior bending of the head. The posterior sutures were placed with the knots within the tracheal lumen.

Next, the thyroid gland was divided through its isthmian portion and a tracheotomy tube inserted. The mediastinum was drained and penicillin powder was strewn over the raw surfaces. Finally, the sternum was reunited and the pleural cavity aspirated.

That same night two Pezzer catheters had to be inserted supraclavicularly into the pleural cavity on each side and continuous suction applied (bilateral pneumothorax). On the third postoperative day, despite energetic antibiotic therapy, bronchopneumonia developed in the left lower pulmonary lobe, and from the sixth day on, despite improvement in the general condition (a subfebrile condition), the left side developed a hydropneumothorax. At this time the tracheal cannula was removed. On the fifteenth postoperative day the left lung had cleared up; on the sixteenth the roentgenogram indicated a cloudiness over the apex of this lung but after puncture 4 cm. of pus were removed; this cleared up under antibiotics in 4 days. On the twenty-second postoperative day a small granulation was removed from the left side of the anastomotic line by means of a bronchoscope introduced through the tracheotomy opening. The lingering subfebrile temperature eventually was found to have been caused by a circumscribed osteomyelitis at the site of resection of the sternum; following removal of a small sequestrum this condition also cleared up.

At the end of the third postoperative month the patient left the clinic in good health and without symptoms. The bronchoscopic and tracheographic examinations disclosed a completely normal tracheal lumen; the line of anastomosis was barely detectable. After 12 months the patient was found to have gained 15 pounds in weight and was without symptoms.

The histologic examination of the removed portion of the trachea showed that the stenosis was produced predominantly by cicatricial tissue containing the foreign body type of giant cells. Thus, the authors conclude that the cause of the stenotic condition was trauma due to a foreign body.

—John W. Brennan, M.D.

Therapeutic Principles to be Observed in the Treatment of Bronchiectasis (Therapeutische Richtlinien bei der Behandlung Der Bronchektasienkrankheit). A. BRUNNER. *Thoraxchirurgie*, 1955, 3: 177.

A TOTAL of 111 pulmonary resections in 98 patients since the introduction of intratracheal anesthesia and of penicillin in 1947 at the author's clinic comprise the substance of this report. The mortality since that date from this operation for bronchiectasis has been 3 (2.7 per cent). Since 1951, however, there has been an uninterrupted series of 68 operations without a single death.

In the entire material there has not been a single example of insufficiency of the bronchial suture. It is true that in 4 instances an internal fistula developed; this was treated by the drainage method of Buelau. However, since this complication appeared following segment resection in each case and could be easily healed by simple drainage of the secretions to the outside, this episode could hardly represent the giving way of a larger suture line such as that closing the main bronchus, but must be the result of the formation of a parenchymatous fistula of the intersegmental surfaces.

In summing up the deductions derived from his experiences with this material the author concludes that the overstretching of a healthy portion of the residual lung tissue does not induce a reappearance of the bronchiectatic condition. It does not result in anything more serious, as a rule, than a certain amount of pulmonary emphysema. In fact, on the basis of animal experimentation it may be assumed that in a youthful individual true hypertrophy of the residual lung tissue may be expected. The author considers the most favorable period for operation that between the twentieth and thirtieth years of life; in the very youthful a sufficient degree of co-operation cannot be depended upon. Of course, in cases in which the indication exists operation may be done in the aged patient. However, the surgeon should take into account the fact that the risk will be greater in an individual whose circulatory system is no longer perfectly intact and, in addition, has been more or less damaged by the toxic action of a prolonged suppurative process.

A second conclusion is that when the residual lung tissue becomes atelectatic and when, even under correct management, the atelectatic portion does not within a short time (the same day, if possible) become air-containing, there is danger of a renewed production of bronchiectasis in the remaining uninvolved lung tissue because of the constant pull of the shrinking atelectatic tissue.

A third conclusion is that when a purulent expectoration persists following a lung resection in a case without atelectasis of several days' standing and in which bronchoscopy does not reveal the origin of such expectoration, such as a diffuse bronchitis of the entire respiratory tract, the presence of additional bronchiectatic cavities, either in the residual lung tissue or in the opposite lung, must be sought.

The final conclusion is that when the pulmonary resection or, if necessary, repeated resection results in the removal of all the pathologically changed pulmonary segments, a complete cure of the patient may be confidently expected. *—John W. Brennan, M.D.*

Bronchial Carcinoma with Symptomatology of a Lung Abscess (Bronchial-Krebse mit der Symptomatologie eines Lungenabscesses). B. LÖHR and E. SODER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 648.

IN 11 OF 62 PATIENTS admitted in the past 3 years to the Surgical Clinic in Heidelberg with the diagnosis of a pulmonary abscess, bronchial carcinoma was found.

A central necrosis may develop in a pulmonary neoplasm with a predominantly eccentric growth. The pathogenesis of such a condition is attributable to circulatory disturbances. The debris undergoes enzymatic liquefaction. The fluid may be absorbed or it may escape through a communicating bronchus.

In contradistinction to such aseptic evolution, in another group of cases a tumor may produce a poststenotic bronchiectasis, atelectasis, pneumonia, and, finally, an abscess. Such formation is of an infectious origin and is located not within the tumor but distal to it. The causative factor of such a lesion is not easily recognizable clinically or roentgenologically, contrary to a carcinoma with a central necrosis which casts a circular but slightly irregular shadow with a light center and a fluid level.

X-ray studies, particularly bronchography, are of paramount importance for the differentiation of benign and malignant pulmonary lesions. They should be supplemented by bronchoscopic examination and lavage of the bronchi, with a subsequent cytologic study of the washings. Transpleural aspiration is employed by the author only in exceptional cases.

Thoracotomy is the method of choice, while drainage can be considered only as a palliative measure.

According to the statistics, 17.7 per cent of all pulmonary abscesses are caused by bronchial carcinoma.

—*Joseph K. Narat, M.D.*

HEART AND PERICARDIUM

Coronary Perfusion for Longer Periods of Cardiac Occlusion Under Hypothermia. NORMAN E. SHUMWAY, MARVIN L. GLIEDMAN, and F. JOHN LEWIS. *J. Thorac. Surg.*, 1955, 30: 598.

AN INDIRECT METHOD of coronary perfusion was devised. The perfusate which was pumped into the isolated proximal aorta reached the right heart via the coronary sinus, the anterior coronary veins, and the thebesian veins, and was aspirated by suction from a cardiotomy wound or from the isolated pulmonary artery. The perfusion pressure varied from 25 to 85 mm. Hg. at a flow rate from 50 to 85 c.c./minute. The perfusion experiments were done in hypothermic animals at 25 degrees C. with occlusion of the circulation for 20 minutes.

The perfusate studied in the first series consisted of the animals' own blood heparinized and saturated with oxygen by a bubble type of oxygenator. In the second series the perfusate was venous blood obtained from donor animals.

By means of coronary perfusion, circulatory interruption to the brain for a period of 20 minutes did not cause neurological damage in hypothermic animals. During this period intracardiac surgery of any type can be performed. Perfusion of the heart via the coronary system was not complicated by air embolization provided the perfusion pressure did not fall below 70 mm. Hg.

—*B. G. P. Shafiroff, M.D.*

Technical Factors Which Favor Mammary-Coronary Anastomosis; with a Report of 45 Cases of Human Coronary Artery Disease Thus Treated. ARTHUR VINEBERG and WILLIAM BULLER. *J. Thorac. Surg.*, 1955, 30: 411.

THE AUTHORS review over 10 years of experimental and clinical work, and present certain conclusions as to the factors which play a part in preventing occlusion of the implanted artery.

Factors which affect the successful transference of an artery of the chest wall into the myocardium, where it may function as an extracoronary artery, are as follows: (1) the method of detachment of the internal mammary artery from the chest wall, (2) the method of implantation into the left ventricular myocardium, and (3) the condition of its myocardial environment.

The technique is reviewed at some length. A right lateral approach is used with removal of the sternocostalis muscles from the fourth to sixth costal cartilages, thus exposing the internal mammary artery and vein. When longer lengths of artery are freed there is greater danger of angulation, kinking, and twisting. A strict no-touch technique is used with presentation of perivascular tissue. The distal end of the artery is closed, as the authors feel there is a better chance of new vessels growing out from the side of the internal mammary artery.

A portion of the myocardium on the anterior wall of the left ventricle which is not scarred is selected for implantation. A tunnel one inch in length is formed in the middle of the ventricular wall, care being taken not to penetrate the endocardium. The sixth intercostal artery is then cut level with the internal mammary artery wall, following which the end of the mammary artery is gently pulled through the tunnel.

There is a vast difference between skeletal and myocardial muscle. The myocardium is composed of a spongelike network of vessels. When the internal mammary artery is placed in the myocardium, it is placed there with an open, bleeding sixth intercostal vessel. The blood from this vessel flows into the tunnel and disappears; a hematoma is never formed. In the heart, due to its spongelike character, blood continues to flow down the internal mammary artery and out through the slit in its wall, thus keeping the artery open until it forms new branches which join with the coronary arterioles around it. It is the authors' belief that in making the tunnel, myocardial sinusoids (described by Wearn) are broken into, and it is into these that the internal mammary artery bleeds.

The duration of the anastomosis is dependent upon the need for it. When myocardial ischemia is present, theoretically it should stimulate the implant to branch and thereby increase blood flow down through the implanted artery, thus keeping it open. Conversely, if there is no need for the implant the rate of blood flow through it decreases, thereby favoring occlusion by thrombosis or internal proliferation.

The authors confirm this concept. When the internal mammary artery is placed in ischemic animal

hearts, there is a mammary-coronary anastomosis rate of 71 per cent. In 7 human cases examined 10 hours to 10 days after implant, the artery was found to be open in 71 per cent.

Intimal proliferation occurs to a slight extent in all implanted internal mammary arteries. This, however, increases when the blood flow through the artery is slowed. Thus, in the same implant, intimal proliferation may be absent proximal to open branches and very marked distal to them.

When an artery is placed in an ischemic heart there is practically no intimal proliferation proximal to open branches.

The mortality rate among 45 patients treated by implant is given, and the results in 40 patients who were followed 6 months to 4.5 years are presented. The results in the treatment of human cases of coronary heart disease are very satisfactory. Seventy-eight per cent of the group were not working prior to surgery, and 77 per cent have returned to work.

—*Alan L. Dorian, M.D.*

The Closure of Atrial Septal Defects. E. J. Moeys. *Arch. chir. Neerl.*, 1955, 7: 181.

The closure of atrial septal defects is a feasible and desirable procedure. The author points out that in the future it may be easier to do such procedures under conditions of hypothermia or complete cardiac by-pass, particularly since defects in the ischemic heart are always smaller than the same defects in a blood-filled heart. However, at present, atrioseptopexy can be done without hypothermia or by-pass. The method of Söndergaard is recommended for closure of persistent ostium primum and for treatment of complete absence of the septum. Atrioseptopexy is recommended for closure of patent foramen secundum and of defects associated with the transposition of pulmonary veins.

Exact diagnosis should be made under any conditions by means of intracardiac digital control. Whichever method is used to deal with the particular defect encountered, precautions must be taken against (a) injuries of the atrioventricular valves; (b) stenosis of the entering venae cavae and the sinus venosus; (c) failure to apply intracardial digital control; (d) producing lesions of the bundle of His.

In this excellent article, the author summarizes the embryology, pathologic anatomy, physiology, clinical features, and surgical indications for surgical treatment of atrial septal defects.

—*Franklin Lounsbury, M.D.*

Considerations with Reference to the Surgical Treatment of Mitral Pathology; On the Basis of 350 Personal Interventions (Considerazioni sul trattamento chirurgico dei vizi mitralici; su 350 interventi personali). A. M. Dogliotti. *Chir. torac.*, 1955, 8: 93.

In this series of 350 operations there were 15 deaths (6.8 per cent); however, the mortality for the first 100 operations was 9 per cent; that for the second 100, 3 per cent; 2 per cent for the third 100 operations and 2 per cent for the last 50 operations. Part of this improvement in the mortality statistics was, of course, the result of greater experience on the part of the surgeon; however, there were also some changes in technique. At first the commissurotomy was performed with the tip of the finger; later the author designed and introduced a commissurotomy ring.

Of the 15 deaths, 2 were due to intraoperative hemorrhage, 1 was due to occlusion by embolus of the mitral ostium, 4 were due to cerebral embolus, 1 was due to thromboembolism of the renal and mesenteric arteries, 1 to a suspected mesenteric embolus, 1 to a massive embolism of the right branch of the pulmonary artery, and 5 were due to cardiac decompensation. All of these deaths were immediate (during the operation itself or within 30 days thereafter). The delayed mortality comprised 7 cases (2.8 per cent).

In order to evaluate the ultimate result in the patients who survived, the groups were divided according to the following criteria: optimum results (99 patients, 27 per cent) comprised those cases in which the valvulotomy had produced an ostium of sufficient amplitude but without inducing reflux of the blood through the valve operated upon and in which the mitral valve appeared normal after operation; satisfactory results (171 patients, 48 per cent) comprised those cases in which the resulting ostium was ample without creating a reflux, but in which the valvular flaps appeared sclerotic or were actually calcified; discrete results (39 patients, 11 per cent) comprised those cases in which extensive sclerosis or calcification did not permit an ample commissurotomy or in which the intervention produced a valvular reflux of a hemodynamically damaging character; no results (17 patients, 5 per cent), of course, need no criterial clarification; in fact, 2 of these patients could not be operated upon at all.

The impressions of this experienced surgeon with reference to the matter of surgical indications and contraindications are interesting. He does not think that the age of the patient is as important as other considerations (general condition, character of the valvular pathology present, and the presence or absence of the degree of damage to the other organs of the body). Females seem to stand the operation somewhat better than males. With reference to the size of the heart it is thought that the best results are to be expected when the only portions of the heart which are enlarged are the pulmonary artery and the left atrium. With marked dilatation of the right heart it would perhaps be better to delay the operation for the purpose of improving the cardiac dynamics by means of adequate medical therapy. Enlargement of the left ventricle may be an expression of aortic pathology, a condition which would naturally aggravate the prognosis; nevertheless, none of these conditions comprise an absolute contraindication to the operation. A history of attacks of pulmonary edema and of embolism may actually represent an indication for the operation as the only hope of preventing further such episodes.

Rheumatic residua or recrudescence indicates delaying the operative procedures until, under antirheumatic medical treatment (salicylates, pyramidon, ACTH: G. C. Dogliotti), the rheumatic activity (fever, tachycardia, pains, accelerated sedimentation rate, and augmented white cell count) has completely regressed.

When the mitral stenosis is associated with other lesions surgery is not necessarily contraindicated; in

mild mitral reflux the operation may produce an evident amelioration of the hemodynamics; however, when the reflux is important one will seldom see much benefit from commissurotomy. Of course, when the reflux is uncovered only during operation something may be done, as in 1 of the author's patients, by way of a small valvuloplastic procedure. When there is present an associated aortic stenosis a combined valvulotomy at the same operative session may be considered opportune. In the presence of aortic insufficiency it may be advisable to make the mitral valvulotomy less ample, in order not to overburden the left ventricle suddenly. In 3 of the author's patients a concurrent valvulotomy of the tricuspid valve was successfully performed.

Evidence of insufficiency of other organs of the body (kidneys, liver) frequently disappears with the improvement in circulatory conditions incident to the valvulotomy. The functional insufficiency of the tricuspid valve resulting from the general dilatation of the right heart is susceptible to amelioration under stimulant medical treatment and rest.

The author has successfully operated upon a patient in the third month of pregnancy; he has successfully operated upon 2 patients with peripheral arterial hypertension. In the presence of symptoms of hyperthyroidism, suitable preoperative treatment is recommended. —*John W. Brennan, M.D.*

Mitral Valvotomy; a Follow-Up of 45 Patients for 3 Years and Over. Charles Baker, Russell Brock, and Maurice Campbell. *Brit. M. J.*, 1955, 2: 983.

Follow-up studies of 45 patients, 3 years or more after mitral valvotomy, are presented. The clinical states of the patients before and after the operation were graded according to the degree of disability: 0, no disability; 1, slight disability; 2, moderate; 3, gross; and 4, total incapacity. Preoperatively 20 of the patients were in grade 4, 24 in grade 3, and 1 was in grade 2. Twelve patients had a cardiothoracic ratio of 60 or over, and 5 had one of over 65. Eighteen patients had atrial fibrillation. In the classification of results excellent means 3 or more grades of improvement; good, 2 grades; fair, 1 grade; and poor, no improvement.

At the end of a year 38 patients were classed as having good or excellent results, 5, only fair results, and 1 had a poor result. During the second year 4 patients lost ground and 2 died. Three of the 4 dropped from the good class, and 1 dropped from the excellent to the good class so that there were 35 of the 45 with good or excellent results at the end of the second year. In the third year 2 patients showed further deterioration, one of them dying, and 9 more patients lost ground so that the number left with good or excellent results was 29 at the end of 3 years.

Thus, of the 45 who had survived the operation, 4 had died and 12 had lost some of their original improvement, and 5 of these were as incapacitated as before operation. Nine of the 29 have been followed up for a longer period. At the end of the fourth year 2 had lost ground and 2 remained with good, and 5 with excellent, results. Three patients are completing their fifth years, 2 remaining with excellent results, while the third patient was operated upon more than 6 years ago with a result that deteriorated from excellent to fair in the third and fourth years and has remained fair in the fifth and sixth years.

The size of the heart, the degree of disability, and the presence of atrial fibrillation before operation did not seem to influence the result in this 3 year period. Operations should be most successful when the mechanical defect is severe and the heart muscle relatively good, and measurement of the valve at operation showed that the results were better when it was less than 1 cm. in diameter. The best indication of a lasting good result was the surgeon's account of what he was able to achieve at operation. When he found it impossible to produce an opening that was as much as 2 cm. in diameter or when there was gross incompetence, there were no good results. When he was able to produce a full opening, or one over 3 cm. in diameter, there were 17 good results and only one poor one. When the valve size was intermediate, the results were intermediate.

Mitral regurgitation before valvotomy did not always prevent a good result, but even a slight degree reduced the proportion of good results and increased those which were only fair. Regurgitation was produced by valvotomy in 6 of the 45 cases, and in 3 of these the result was poor or only fair. In 3 it seems unimportant so far.

Pulmonary hypertension is a reason rather than a contraindication to valvotomy. A successful valvotomy always reduced the hypertension and, in general, the greater the degree of pulmonary hypertension, the better the chance of a good result.

The occurrence of atrial fibrillation after operation was the most disappointing feature. In 3 patients fibrillation occurred after operation and normal rhythm could not be restored. All of these patients have done badly. Those who had fibrillation before operation actually did better in maintaining the improvement gained by valvotomy than those who had normal rhythm before.

The prognosis in a young patient depends mainly on whether he receives further cardiac damage by further rheumatic infection. This is less probable in older patients.

To summarize the prospects that a good result will endure, the writers counted 2 patients who lost much of their improvement equal to one who lost all of his improvement and found that 2 per cent of the patients lost all of their improvement in the first year; 6 per cent in the second year; 10 per cent in the third, and perhaps 15 per cent in the fourth year. Although this shows progressive deterioration as the years pass, it is better than a preliminary estimate made one year before and may become better as more patients are followed up. It is unlikely, however, that improved selection and improved surgery will ever prevent some progressive deterioration, as the operation is dealing with a heart that has been damaged by rheumatic infection.

The authors stress that this paper is a follow-up of their first 45 patients. These early patients were selected because of their bad prognosis, and some were operated upon before the technique of mitral valvotomy had been perfected.

—*Robert Paradny, M.D.*

An Analysis of 50 Patients Treated by Mitral Commissurotomy 5 or More Years Ago. ROBERT P. GLOVER, THOMAS J. E. O'NEILL, and O. HENRY JANTON. *J. Thorac. Surg.*, 1955, 30: 436.

THE AUTHORS present the available data concerning 50 patients treated by mitral commissurotomy, the first of whom was operated upon in January 1949.

None of these patients was in stage 1 (murmur without symptoms). Five patients (10 per cent) were suffering from fatigue and exertional dyspnea but as these symptoms had not progressed materially in the preceding year they were classified as stage 2 (statically incapacitated). In 36 patients (72 per cent), in spite of continuous and vigorous medical management, a progressively downhill course was apparent (stage 3, progressively incapacitating). The remaining 9 patients (18 per cent) showed constant evidence of congestive failure and were classified as stage 4.

There was an operative mortality of 6 per cent (3 patients) and a late mortality within the first 3 postoperative years of 12 per cent (6 patients). The remaining 41 patients are living today.

In the entire group of 41 living patients there are now 14 in stage 1, 18 in stage 2, 7 in stage 3, and 2 in stage 4. It is readily apparent, therefore, that only one patient in the series is now classified at a higher level of incapacity than that prior to surgery.

According to their present classification as rated by the authors, 30 patients are better after 5 years than they were preceding surgery. According to the patients themselves, 72 per cent are definitely better after 5 years than they were prior to surgery.

Only 4 of these 41 living patients have a completely murmurless heart at this time. Eleven have lost all evidence of mitral diastolic murmur. Fourteen patients now have a systolic murmur at the apex in the mitral area of various degrees which they did not have prior to surgery.

From a functional standpoint, those patients who had a pure murmur of mitral stenosis prior to surgery have had the best results; 14 are now in excellent condition, 9 are improved, and 2 are unimproved. In the 10 patients whose ailment was predominantly mitral stenosis but who had an associated systolic component to the murmur prior to surgery, 4 obtained an excellent result, 4 were improved, and 2 were unimproved.

Electrocardiographic changes in a considerable percentage of patients are present indicative of a definitive return toward the normal. Fluoroscopic and teleroentgenographic studies indicate a significant point in the fact that 5 or more years after surgery 87 per cent of the patients are observed to have a heart the same size or smaller than it was before surgery, whereas in the years preceding surgery it was progressively becoming larger.

Cardiac catheterization data parallel and corroborate the observed functional state of the patient, whether he be improved or unimproved.

In 20 of these patients valvular calcification was present and the degree of improvement in these, although quite satisfactory, was not as great as that seen in the 21 patients whose valves were free of calcium deposits.

Definite evidence of rheumatic activity was observed during the postoperative period in 8 patients. No evidence of valvular restenosis has been observed in the 41 living patients nor in the valves of those who died in the postoperative period.

Only one operative embolus was produced in these 50 patients and that patient has obtained complete recovery of her left hemiplegia except for restoration of the finer motions of the left hand. There have been no postoperative emboli to date (12 per cent prior to surgery).

The authors believe there is no question but that commissurotomy has been of untold value to the majority of patients in this series and, for the most part, that degree of improvement which was obtained in the first postoperative year has been maintained over a 5-year period.

The authors postulate that could the technical experience obtained in their over-all series of 740 commissurotomies have been applied in the cases of these first 50 consecutive patients, the results might well have been considerably better.

—*Alan L. Dorian, M.D.*

The Rationale of Anastomosis of the Right Auricular Appendage to the Pulmonary Artery in the Treatment of Tricuspid Atresia; Application of This Procedure to a Case of Cor Triloculare. ELLIOTT S. HURWITT, DENNISON YOUNG, and DORIS J. W. ESCHER. *J. Thorac. Surg.*, 1955, 30: 503.

THE BLALOCK or the Potts type of anastomosis for tricuspid atresia yielded a 21 per cent immediate mortality and an additional 5 per cent mortality within 8 months of the postoperative period. In another series more than two-thirds of the patients with tricuspid atresia were dead within 1 year whether operated upon or not. Experimentally, an anastomosis of the right auricular appendage to the main pulmonary artery after obliteration of the tricuspid orifice resulted in propulsion of systemic venous blood by the right auricle into the pulmonary circulation.

The patient was a 4 month old boy, weighing 7 lb., with marked cyanosis for which oxygen was constantly necessary. The electrocardiogram indicated left ventricular enlargement, and roentgenograms and fluoroscopy were suggestive of the tetralogy of Fallot. Operation was undertaken after 20 days of hospitalization, during which time the baby suffered from severe dyspnea. Under hypothermia at 90 degrees F., the thoracic cavity was entered through the third transsternal interspace. The thymus was mobilized and retracted from the heart and the pericardium opened by a T-shaped incision. The right auricle was markedly enlarged and the appendage was deep blue in color. The main pulmonary artery was hypoplastic, measured 6 mm. in diameter, and arose from a rudimentary right ventricle. The pulmonary arterial pressure was 11 mm. Hg. with oxygen saturation of the blood at 27.5 per cent; in the auricle the pressure was 7 mm. Hg. with oxygen saturation at 22.5 per cent. An anastomosis was performed between the right auricular appendage and the mobilized pulmonary artery. The infant died postoperatively.

At autopsy a cor triloculare with a single ventricle and a rudimentary conus were found. The ductus arteriosus was obliterated and the pulmonic valve was bicuspid.

Right auricular pulmonary artery anastomosis should be performed only when a pressure gradiant can be demonstrated. —*B. G. P. Shafiroff, M.D.*

Surgical Correction of Tetralogy of Fallot; Results in the First 100 Cases 6 to 8 Years After Operation. Willis J. Potts, Stanley Gibson, Edward Berman, Harvey White, and Robert A. Miller. *J. Am. M. Ass.*, 1955, 159: 95.

Willis J. Potts and associates report 6 to 8 year follow-up studies on the first 100 consecutive cases of tetralogy of Fallot in patients operated upon at the Children's Memorial Hospital in Chicago. Aortic pulmonary anastomoses were performed in 99 cases and subclavian pulmonary anastomosis in one patient. A 100 per cent follow-up was obtained, the majority by personal interview. There was a 9 per cent overall hospital mortality, a 17 per cent mortality in children under 3 years of age, and a 4.6 per cent mortality in children over 3 years. Five other children died during the follow-up period. In addition, 4 children required a second operation to relieve recurrent cyanosis. This was successful in 2 cases.

The 86 patients who survived for 6 to 8 years were all categorized clinically. In 68 children the results were classified as "good," i.e., the children attended public school, rode bicycles, had minimal cyanosis and, except for violent exercise, were able in general to do what other children their age could do. In 16 children the results were classified as "fair," i.e., improved, but still moderately handicapped. In one child the results were classified as "poor," and one child was unimproved.

In 51 cases the authors were able to compare the amount of cardiac enlargement after 6 to 8 years. Twenty-eight of these had only slight enlargement, if any, and 9 had marked enlargement (over 50 per cent). In general, the hearts enlarged soon after surgery, and have not changed in size in 6 to 8 years. In a number of children with markedly enlarged hearts, the results are classified as good clinically. The authors suspect that ultimately these children will have more trouble than those children with minimal cardiac enlargement.

Fifty patients had late electrocardiograms, and only 6 showed a pattern of combined heart strain, the remainder showing few significant changes.

—*John C. Carlisle, M.D.*

ESOPHAGUS AND MEDIASTINUM

Clinical Study of Esophageal Reflux (Étude clinique du reflux oesophagien). P. Hillemand, R. Viguié, R. Wattebled, and J. Duron. *Arch. mal. app. digest.*, Par., 1955, June supp. 63.

The authors define esophageal reflux as the passage of gastric contents from the stomach to the esophagus without participation of gastric, abdominal, or diaphragmatic muscles, thus eliminating vomiting, belching with and without regurgitations, as well as merycism.

The esophageal reflux is a disease such as duodenogastric reflux, the reflux of Wirsung, and choledochal reflux, which is frequently associated with other conditions, and is manifested by many symptoms, but it may also be silent and latent and may be present even without being visible roentgenographically. It occurs more frequently than has hitherto been estimated. The present report is based on 240 observations of 148 female patients whose average age was 65 years and 92 males whose average age was 45 years.

The predominant clinical manifestation of esophageal reflux is the pyrosis which comprises: (a) esophageal burning, the main characteristic of which is the ascending radiation from the epigastrium towards the sternal fork, influenced or started by the patient's position or change of position; (b) regurgitations, fluid gastric backflow, more or less abundant, of acid or bland taste, colorless or yellowish, produced without any vomiting effort. The appearance of the two symptoms is often strikingly provoked by certain conditions and of these, the change of position is the most important. Anteflexion of the trunk, lying down, or with a change of position in bed may start esophageal burning, regurgitations, or both, especially in nocturnal pyrosis. Less frequently noticed causes are cough, moving of the bowels, the wearing of a belt, or other conditions producing elevation of abdominal pressure. Still less important is the time factor regarding particular hours during the day or at night, or in particular seasons. There may also be pain, often ascending, belching, salivation, vomiting, dysphagia (seldom), and very rarely elevated temperatures of around 38 degrees C. (i.e., 99 degrees F.).

The esophageal reflux and its symptoms have been observed mostly in short patients with a tendency to obesity.

Etiologic Forms of Reflux

1. Diaphragmatic hernia is the most frequent cause of esophageal reflux and may often be detected by taking an exact history and differentiating between the specific pains caused by the hernia and the symptoms of the reflux. Cardioesophageal hernias frequently cause esophageal reflux and its symptoms, which generally disappear after operation. Less frequently, paraesophageal hernias cause reflux.

2. Malformations due to rickets, kyphosis, and scoliosis may deform the esophageal hiatus and cause reflux.

3. Endocrine disturbances (hypothyroidism or spasmophilic states) may be associated with esophageal reflux, the symptoms of which sometimes disappear clinically or roentgenologically, or both, after treatment of the endocrine condition. The reflux, however, cannot be considered solely as an endocrine condition, nor as a mechanical one, but rather as a combination of both. The most striking example of this is the reflux in pregnancy which is due to abdominal hypertension and endocrine tissue relaxation, often combined with hiatus hernia, which disappears after delivery.

4. Affections of the biliary ducts may sometimes cause esophageal reflux or hide a latent one, and should always be considered in this condition. Esophageal reflux may also be associated with gastric or duodenal ulcers, cardiotuberous malpositions, brachyesophagus, often combined with a hiatus hernia, and with esophageal, duodenal, or colonic diverticula. After gastrointestinal operations such as esophagectomy, esophagogastric anastomosis, and gastrectomy,

other esophageal reflux may be noticed; it occurs also in elderly people as a result of tissue relaxation.

5. Finally, it may appear in young persons without any obvious cause, and some disturbance of the autonomic nervous system may be suggested as the causative factor.

The most frequent complication is esophagitis, which is diagnosed by esophagoscopy only when there is no other way to confirm it. This complication is more or less frequent, and more or less severe, ranging from edematous swellings to diffuse hemorrhagic forms; it may be local or general; in some cases the symptoms are acute, in others the condition is clinically silent. Chemical analysis of the gastric contents was of no aid in forming any definite conclusions. Hemorrhagic esophagitis is often associated with hiatus hernia and may cause hypochromic anemias, in which event surgery may be indicated.

The frequency of occurrence of esophageal reflux and its main symptoms have been demonstrated. Of the various etiologic factors, two main groups may be distinguished: (1) reflux secondary to organic lesions—secondary chiefly to diaphragmatic hernias; (2) functional forms of reflux due to hypotony (of muscles) because of endocrine insufficiency, or dyskinesias due to a reflex mechanism on the basis of biliary stones, malformations caused by rickets, or duodenal or gastric ulcers. The main complication is esophagitis, often detected only on esophagoscopy.

—*I. Hochberg, M.D.*

The Treatment of Esophageal Varices in Portal Hypertension by Means of Sclerosing Injections. Ronald Macbeth. *Brit. M. J.*, 1955, 2: 877.

The author described a method of injecting esophageal varices and reported 9 cases in 1949. This present report deals with 30 patients who have been so treated and presents the results.

Fourteen of the patients had had some degree of liver disease and the portal hypertension was of an intrahepatic origin. The remaining 16 patients had had no liver damage by biochemical tests of liver function and in many of these the obstruction was believed to be extrahepatic.

In the group of patients with liver damage the prognosis was poor. This group had an age range from 5 to 72 years. The patients were injected on an average of three times and 7 of them survived for one year or longer. The longest survival was 7.5 years.

The age range of the 16 patients without liver damage was from 5 to 60 years. Fourteen of these patients are alive and well, the longest survival being 11 years.

Through the largest esophagoscope that can be passed the veins are injected with sodium morrhuate 5 per cent, 3 or 4 ml. at each injection. About six injections of this size are made at any one time and the procedure is carried out under general anesthesia. The vein is put on the stretch by the tip of the scope prior to the injection and as the needle is withdrawn the area is compressed with gauze held in a long alligator forceps. Should marked bleeding occur, a Sengstaken double balloon tube is used to control the hemorrhage.

Since many of the veins of the esophagus which are dilated are serving to reduce portal pressure only the subepithelial veins which may rupture are in need of obliteration. The author believes that the injection technique has the advantage of obliterating these veins while allowing blood to flow through the submucosal and subserous veins. The various methods of ligation tend to obliterate the veins at all levels.

Once the injection treatment is started the routine is to repeat it every one to two weeks until no veins remain uninjected. The patients are re-examined at 3 months and if free of varices at another 6 months. They are then followed up and examined at 6 to 12 month intervals.

Splenectomy is a valuable adjunct to the injection technique. Following a recent hemorrhage the offending vein should be injected, splenectomy carried out, and, finally, the injection course completed.

—*John H. Davis, M.D.*

Cervical Esophagojejunostomy for Extensive Strictures of the Esophagus. Reeve H. Betts, T. Thomas, and N. Gopinath. *Surgery*, 1955, 38: 553.

This is a report of 9 extensive benign strictures of the esophagus treated by the method of Robertson and Sarjeant. In most cases the stomach can be brought up to the neck, although with an appreciable mortality rate, but occasionally, when the esophageal stricture is due to the ingestion of some strong alkali or acid, the stomach is seriously burned and becomes so reduced in size that it is no longer of use for such purposes. In such cases a segment of colon has been used, but the authors preferred to use the jejunum, passing it transthoracically, but extrapleurally and substernally, to avoid an open thoracotomy. The cervical esophagojejunostomy may be done as a second stage if there is any question regarding the viability of the cervical end of the jejunum.

After describing the technique used, the authors cite their experience. There were no deaths in the series, but complications included temporary salivary fistulas, postoperative pneumonias due to the aspiration of saliva of the strictured esophagus (these patients had been aspirating saliva prior to surgery), and, in one instance, the loss of the jejunal segment. The problem of the maintenance of adequate nutrition when the stomach is sidetracked is mentioned, but has not been a factor so far in the cases reported.

—*David T. Petty, M.D.*

Mediastinal Tumors of Thyroid Origin. J. L. Ehrenhaft and Joseph A. Buckwalter. *Arch. Surg.*, 1955, 71: 347.

Thirteen patients with mediastinal thyroid masses provide the experience from which the following conclusions are drawn. If only those patients are considered whose goiters are entirely below the thoracic inlet, they constitute only 1 to 2 per cent of all cases. Diagnoses can be made with certainty in most cases by examination of roentgenograms in three planes, by radioiodine uptake patterns, and by signs and symptoms of tumors compressing other mediastinal structures. Occasionally, bronchoscopy or bronchograms assist the investigator.

Anterior mediastinal tumors had best be approached by a sternum-splitting incision which allows cervical exploration, if desired. Posterior mediastinal goiters

should be removed by right lateral thoracotomy. Two attempts at removal through cervical incisions were compromised by hemorrhage and poor exposure. There was one unfortunate experience with a left thoracotomy. The 13 cases are illustrated.

—Leonard D. Rosenman, M.D.

MISCELLANEOUS

Primary Intrathoracic Nonpulmonary Tumors. JAMES W. FOUCHE. *Am. Surgeon*, 1955, 21: 909.

A GENERAL DISCUSSION of primary nonpulmonary tumors of the thorax is presented. Soft tissue tumors, metastatic tumors of extrathoracic origin, and mediastinal lymph node diseases are not included in the study.

The clinical picture is very variable. All of the classical symptoms and physical signs found in the field of chest pathology may be present, or, more usually, there are no clinical findings and the lesion is diagnosed usually on routine roentgenologic study. The only method of making a definite diagnosis is by exploratory thoracotomy. Although most of these tumors are benign, the majority will produce serious complications or become malignant sooner or later, and therefore all should be removed if this is possible.

The author presents a classification of primary intrathoracic nonpulmonary tumors with illustrative cases and roentgenograms:

A. Thoracic cage.
   1. Rib, the chondroma and chondrosarcoma are the most common.
   2. Sternum, primary tumors are rare, and usually the only symptom is pain or the finding of a mass.

B. Pleura, primary cysts, mesothelioma (diffuse or localized)

C. Anterior mediastinum.
   1. Lymphomas
   2. Teratoid and dermoid tumors
   3. Thymus, benign or malignant thymoma
   4. Heart and pericardium
      a. Pleuropericardial cyst
      b. Pericardial diverticulum

D. Posterior mediastinum.
   1. The most common tumor is of neurogenic origin, arising from spinal, intercostal, and sympathetic nerves and ganglia. Usually these originate from within the intervertebral foramina, producing a dumbbell type of tumor.
   2. Benign lesions of the esophagus
      a. Enterogenic cyst
      b. Leiomyoma

E. Superior mediastinum.
   1. Bronchogenic cyst.
   2. Retrosternal thyroid.

—Robert Paradny, M.D.

Malignant Thymoma and Myasthenia Gravis; Report of a Case and Review of the Literature. WILLIAM L. MORGAN, JR., and HUGH R. DUDLEY. *N. England J. M.*, 1955, 253: 625.

IN A SEARCH of the literature for case reports of malignant thymoma, 44 cases were found which fulfilled the pathologic criteria of invasiveness and cellular type. In 30 of these, myasthenia gravis was known to be present. The sex distribution was roughly equal, and the ages ranged from 10 to 70 years. Pleuritic pain and dyspnea were the most common symptoms, though not of particular diagnostic significance. In patients with myasthenia gravis, the tumor may be recognized before myasthenia develops. The single new case reported here in great detail is an extreme illustration of this.

A 31-year-old white female had a cough and left-sided pleuritic pain in 1943, and a mass was seen anteriorly in the roentgenogram. In 1946, a thoracotomy revealed a hard, pale yellow tumor at the base of the heart, but biopsy was not diagnostic. An exploratory laparotomy in 1951 revealed a rubbery mass behind the stomach, and the diagnosis, based upon biopsy, was malignant tumor, source unknown. She had intermittent chest symptoms until 1953, when a review of the previous slides led to a diagnosis of malignant thymoma. Myasthenia followed, and although there was temporary improvement with prostigmine, death occurred about 2 months after the myasthenia symptoms began. At autopsy, there was tumor extension partially surrounding the great vessels and bronchi, to the first tracheal ring superiorly, and through the left diaphragm to invade the left quadratus lumborum muscle. There was a solitary metastasis in the liver.

Therapy has not been standardized, and surgical extirpation has been unsatisfactory. Of 18 patients who underwent surgery, 5 died immediately. The average duration of life after surgery in the others was 2 years and 2 months. *—Stanley W. Tuell, M.D.*

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

The Diagnosis of Gastric Malignancy in Pernicious Anemia. CYRUS E. RUBIN. *Gastroenterology*, 1955, 29: 563.

IT IS WELL KNOWN that there is an increased incidence of gastric polyps and carcinomas in patients with pernicious anemia. In pernicious anemia there is severe atrophy of that portion of the stomach which normally contains the fundal glands and this atrophy provides a fertile bed in which precancerous polyps and overt malignancies are prone to develop.

When x-ray examination of the upper gastrointestinal tract is the sole method of follow-up study in patients with pernicious anemia, precancerous polyps and early carcinomas are often missed. The author presents a study to evaluate gastroscopy and exfoliative cytology in the detection of curable gastric carcinoma and its precursors.

Twenty-five patients with pernicious anemia in remission and no clinical or roentgenologic evidence of polyps or cancers were examined by gastroscopy and exfoliative cytology. Gastroscopy was performed frequently and chymotryspin lavage was used to produce cellular material.

Gastroscopy revealed one or more benign-appearing polyps in 5 of the 25 patients and the author suggests that annual gastroscopy be added to frequent roentgenologic examination in patients with pernicious anemia.

Excellent descriptions of the cell types exfoliated from the stomach in treated pernicious anemia are presented together with photomicrographs. The author believes that unsuspected cancers would be detected if a greater number of patients with asymptomatic pernicious anemia were examined by exfoliative cytology.

The author concludes that, ideally, all patients with pernicious anemia should have their stomachs examined annually by roentgenography, gastroscopy, and exfoliative cytology. Gastric polyps will be found and they should be removed surgically because if they are not already cancerous, in time they may well be. It is believed that this vigorous approach is warranted because gastric cancer can be investigated, prevented, and occasionally cured.

—*Robert Paradny, M.D.*

Gastric Malignant Lymphoma; Increasing Accuracy in Diagnosis. MELVIN I. KLAYMAN, JOSEPH B. KIRSNER, and WALTER L. PALMER. *Gastroenterology*, 1955, 29: 536.

THE AUTHORS reported their recent experience with 7 patients with gastric lymphoma and with an eighth patient with carcinoma simulating lymphoma.

The diagnosis of malignant gastric lymphoma was suspected first clinically in only 2 of the 7 patients, which emphasizes the protean and nonspecific manifestations of the disease. Six of the 7 patients were examined by the combined techniques of roentgenography, gastroscopy, and exfoliative cytology. Gastric lesions were detected roentgenologically in 4, with one diagnosis of neoplasm, one of probable malignant lymphoma, and 2 diagnoses of benign ulcer. The gastroscopic examinations detected four lesions also, with diagnoses of benign ulcer, neoplasm, a submucosal ulcerating malignant condition, and malignant lymphoma or giant hypertrophic gastritis, respectively. The roentgenologic and gastroscopic methods each detected a lesion missed by the other on one occasion. Exfoliative cytology correctly identified the cellular nature of the lesion in 4 patients; this method failed in 2 cases.

Three of the lesions appeared confined to the stomach at the time the diagnosis was established. However, involvement of distant areas became evident in 2 patients with the passage of time. In each of 5 instances, the surgeon was unable to make the diagnosis by inspection of the gross specimen in the operating room.

The histologic differentiation of a malignant lymphoma from an undifferentiated carcinoma may be very difficult. One patient considered to have a linitis plastica type of gastric carcinoma after roentgenography and gastroscopy was examined cytologically and unequivocal adenocarcinoma cells including malignant signet ring cells were found. At operation, however, the lesion was deemed inoperable; a metastatic omental nodule was biopsied; histologically, this was interpreted as probably a reticulum cell sarcoma or an anaplastic carcinoma. Mucicarmine-stained sections proved the lesion to be an anaplastic, mucinous single cell type of carcinoma and thus confirmed the cytologic diagnosis. The possibility of radiation therapy was discarded.

The combined use of roentgenologic, gastroscopic, exfoliative cytologic, and biopsy methods will increase the accuracy of diagnosis of gastric malignant lymphoma to a highly significant degree. The therapeutic implications are considerable.

—*Robert Turell, M.D.*

The Natural History of Survival in Carcinoma of the Stomach, Treated and Untreated. H. M. POLLARD and KEITH S. HENLEY. *Gastroenterology*, 1955, 29: 526.

THE IDEAL WAY to learn the exact natural history of gastric carcinoma is to study it from the moment cells become carcinomatous to the death of the patient. Such an "ideal" situation will probably never be realized in the human being. Short of that, therefore, one may be able to learn the span of life following (1) the onset of symptoms suggesting gastric carcinoma to death from gastric carcinoma, or (2) the span of life following actual detection of an asymptomatic gastric carcinoma to death from the same gastric carcinoma.

Pollard had occasion to follow up a woman, age 45, personally, from 1937 to her death in 1943 with autopsy proof of a gastric carcinoma. This lesion had been found by means of x-rays in March, 1935, at

which time the lesion was described as showing "cardiospasm, and in following the barium down into the stomach there was a widespread deformity of the mucosal pattern, associated with a deep-seated, tender, palpable mass." Four days later the examination was repeated with the following report: "Extensive inoperable carcinoma invading gastric walls, upper two-thirds of the stomach. Late involvement, esophageal orifice—associated cardiospasm." A consultation was held with the surgeons in 1935 and her lesion was considered to be truly inoperable. Other than specific cardiospasm and one hemorrhage in 1938, she did reasonably well until 1942 when her weight started decreasing. Laporatomy, on November 15, 1942, revealed an extensive gastric carcinoma and she died of a massive gastric hemorrhage on July 28, 1943, more than 8 years and 5 months following the original roentgenogram which was considered to show an "inoperable carcinoma" in the very beginning. The pathologist reported scirrhous ulcerating carcinoma of the fundus and cardia of the stomach with local extension to the neighboring capsule of the liver, the spleen, and to the diaphragm.

The records of all patients suffering from carcinoma of the stomach and treated at the University Hospital, Ann Arbor, between January 1, 1944, and December 31, 1951, inclusive, were studied. All those who were admitted and operated upon in 1951 and all but one of those first seen in 1950 were again traced in January, 1955 and their survival confirmed. Four hundred and seventy-five patients with proved gastric carcinoma were included in this period of study, plus an additional group of 50 patients in whom the diagnosis of gastric carcinoma was "presumptive," or a total of 531 patients observed.

Fourteen of the last 50 patients with a presumptive diagnosis were admitted to the hospital because of their symptoms, and a diagnosis of gastric carcinoma was arrived at clinically by either roentgenography of the stomach, gastroscopy, cytologic study, or a combination of all three. These 14 patients all refused operation of any kind, but follow-up studies of them are available. Their mean duration of symptoms prior to diagnosis was 8.2 months; it was in accord with that of all the other groups.

The total span of known existence of gastric carcinoma in this "presumptive" group of 14 individuals, beginning with the onset of symptoms to the time of their death, revealed a mean survival time of 14.4 months. This period was broken down to 8.2 months from the time symptoms were present to establishment of the diagnosis, and 6.2 months from the date of diagnosis to the time of demise. Of 151 patients who underwent gastric resection, 121 died with a mean survival time of 29.8 months. Thirty patients were alive at the end of the 3 plus years.

The authors believe that there are undoubtedly isolated examples of gastric carcinoma in which the known span of life reaches many years, with an established diagnosis of the disease throughout the entire period. Most of the mean survival times reported in the literature are figured from the onset of symptoms to the time of death, regardless of whether or not there was surgical resection.

—Robert Turell, M.D.

Complete Volvulus of the Small Intestine in Congenital Malformation of the Intestine (A propos du volvulus complet du grêle sur malformation congénitale de l'intestin). ANDRÉ A. ARIANOFF and ANDRÉ HOUSSIAU. *Acta gastroenter. belg.*, 1955, 18: 785.

THE AUTHORS describe in detail the embryological development and rotation of the intestine and the various anomalies due to incomplete or faulty rotation. They report a case of volvulus of the small intestine due to congenital nonrotation.

The overwhelming majority of cases of volvulus due to incomplete rotation are observed in young infants. The interesting feature in the case presented in this article is the age of the patient.

A boy of 5.5 years had developed perfectly normally and had never had any abdominal symptoms until he became ill with signs of an acute condition of the abdomen and low grade fever. An appendectomy was performed and the diagnosis of catarrhal appendicitis was made. The condition of the appendix was not described.

Subsequently to the operation continued vomiting and abdominal distention developed, and a barium meal given 48 hours after operation revealed complete obstruction at the distal end of the duodenum. At the repeated laparotomy complete volvulus of the small intestine was established; the entire large intestine was located in the left half of the abdominal cavity, and the small intestine was suspended on the mesenteric artery and filled the right half of the abdominal cavity. It had completed a torsion of 180 degrees. The duodenum coursed anteriorly and to the right of the colon and continued in a straight direction into the jejunum. The volvulus was repaired without resection or fixation of the intestine to the abdominal wall.

The patient made an uneventful recovery. A control roentgenogram taken 2 weeks after the intervention showed the entire small intestine in the right half of the abdominal cavity and the colon in the left half. A year after the operation the patient was in good health and had had no further abdominal symptoms.

—Werner M. Solmitz, M.D.

The Evolution of the Surgical Approach to the Therapy of Idiopathic Chronic Ulcerative Colitis; One-Stage Total Colectomy and Abdominoperineal Resection. MARK M. RAVITCH and ISIDORE MANDELBAUM. *Surg. Clin. N. America*, 1955, 35: 1401.

CHRONIC nonspecific ulcerative colitis is no more than a syndrome which reproduces itself with sufficient consistency to be recognizable. The first operation directed at the treatment of ulcerative colitis was a sigmoid colostomy performed by Mayo Robson and reported in 1893. The operation was performed in order to permit the local application of astringents to the diseased mucosa. Various local medications were employed with eventual abatement of the bloody diarrhea. The fecal fistula was allowed to close in a month and 3 months later the patient was so well that she was actually constipated.

Keith reported the use of an opening in the ascending colon, and Bolton, of New York, in 1901, following the suggestion of Gibson, described the use of a valvular cecostomy for the treatment of ulcerative colitis with 1:10,000 silver nitrate irrigations. One

year later Weir described, "A New Use for the Useless Appendix in the Surgical Treatment of Obstinate Colitis." For the next 20 years cecostomy and appendicostomy were widely employed in the treatment of ulcerative colitis, the sole purpose being to provide a route of direct access to the inflamed bowel for the administration of local medication. John Young Brown, of St. Louis, developed an interest in the application of the ileostomy to this problem and others. As far back as 1911 he appreciated the necessity for a terminal rather than a tangential ileostomy, although it required another 25 years before terminal ileostomy with the fixation of both bowel ends in the wound was practiced.

Ileostomy began to gain favor and its value was stressed in reports by Coffey in 1913, by Logan in 1919, and by Harvey Stone in 1923. As a direct result of these American efforts, Sir Humphrey Rolleston stated in 1922, "The radical means of providing physiological rest to the colon is complete transverse ileostomy to exclude the colon." At the same time that Brown was demonstrating the value of ileostomy, Sir Arbuthnot Lane performed ileosigmoidostomy, with its only partial by-pass of the proximal colon and utilization of the diseased sigmoid for the anastomosis. This operation failed to yield satisfactory results. Lane then proceeded to excision of the ascending, transverse, and descending colon as a second stage after ileosigmoidostomy.

The surgical treatment of ulcerative colitis for the first decades of this century consisted largely of ileostomy. Ileostomy was often performed on moribund patients. Stone, Jones and Lahey, and others began to preach early ileostomy before hopeless deterioration of the patient's condition and before irreversible damage to the bowel. Attempts at closure of the ileostomy were attended by a disappointingly high incidence of reactivation of the disease with fatal outcome unless the ileostomy was rapidly restored. The hazard of leaving the diseased colon in situ after creating an ileostomy also became gradually recognized as the real direct danger of the operation both in terms of mortality and morbidity. Peritonitis, hemorrhage, dehydration, and embolism were found to be the leading causes of death in ileostomy patients, and it gradually became apparent that salvation lay in the resection of the diseased colon. At first the advocates of colectomy proposed a staged procedure suggesting three stages for the ileostomy and the total colectomy. Gradually the staging of procedures was found to be unnecessary and to have been based on an experience with outmoded methods and techniques. The stages were eliminated from this operation as well. MacGuire described a one stage total colectomy and abdominoperineal resection in 1940. Ravitch and Handelsman, in 1951, recommended a one stage ileostomy and resection of the entire colon and rectum. Counsell and Goligher performed ileostomy and panproctocolectomy in one stage in 4 patients with speedy recoveries. Ripstein reported 2 such successful cases in 1952.

Until a specific therapy is available, total colectomy remains the treatment of choice for patients with severe chronic ulcerative colitis. The chronicity and severity of the disease in a given patient will determine the time of intervention. Massive hemorrhage, perforation of the colon (threatened or actual), obstruction, and suspected development of carcinoma are absolute indications for immediate operation and resection. Patients with fulminating, febrile attacks of the disease, not rapidly controlled by the steroid hormones, should be treated essentially like patients with massive hemorrhage or threatened perforation.

There is a recrudescence of interest in the possibility of saving a small portion of the rectum. The English surgeons maintain that if the anastomosis succeeds, the patient is better off for as long as it can be maintained. In some instances the anastomosis will be indefinitely successful, in others it will only postpone ileostomy by several years. Most surgeons have, however, had the feeling that, except in the very occasional case of sharply limited colitis in which the distal colon and rectum are apparently uninvolved, no attempts should be made at using the rectum for anastomosis with the ileum because of the immediate risk of the operation and the great subsequent likelihood of reactivation of the disease in the rectum. The technique of one stage total colectomy and abdominoperineal resection is described.

—*Robert Turell, M.D.*

Preoperative Preparation of the Colon with Sulfonamides or Antibiotics. Robert Turell, Luis A. Vallecillo, Robert Paradny, and Anthony L. Danza. *Surg. Clin. N. America*, 1955, 35: 1211.

The authors, at the very outset, made it clear that the presurgical preparation of the colon with sulfonamide or antibiotic therapy is only an adjunct to colonic and major rectal operations and not a substitute for sound surgical principles, refinements of technique, or good anesthesia. Nor does bowel preparation replace the need for the correction of dehydration, anemia, hypoproteinemia, avitaminosis, or other deficiencies. Parenthetically, there is no need for sterilization of the colon prior to the performance of simple anorectal operations or operations for the removal of pilonidal disease.

The historic development of sulfonamides was then traced, and it was pointed out that the utilization of the slightly absorbable sulfonamides in conjunction with or without the soluble sulfa drugs has exerted a momentous and profound change in the surgery of the colon. Many surgeons began to abandon multiple stage operations in favor of one stage resections and primary anastomosis. Furthermore, the closed techniques of anastomosis gradually gave way to the open type of anastomosis which is most popular at this time. The incidence of peritonitis and wound infection was lowered to such a degree that the beneficial role of these drugs was compared to that of iodine in the surgery of thyrotoxicosis.

Subsequently, the chronological development of antibiotics was traced. The effect of penicillin, streptomycin, dihydrostreptomycin, chloramphenicol, chlortetracycline, tetracycline, erythromycin, and magnamycin (carbomycin) on the intestinal bacterial population was discussed. It was again pointed out that chloramphenicol (chloromycetin) is a nitrophenol compound and is known to cause granulocytopenia, agranulocytosis, and fatal aplastic anemia.

The myelotoxicity, believed to be due to its nitrozene radical, is extremely serious.

Turell *et al.* pointed out that the ideal single drug for the preoperative sterilization of the colon is not yet available, that the complete sterilization of the large intestine is neither possible nor desirable, and that the presurgical bacteriologic preparation of the bowel has become almost a universally accepted practice in spite of the contrary or dissenting voice heard at times from the occasional surgeon who prefers to rely on mechanical cleansing of the gut alone. The problem of selecting the proper therapeutic agents and programs is discussed in some detail.

The authors still favor the combination of neomycin with oxytetracycline, reserving the employment of the combination of neomycin with erythromycin for patients who have received large quantities of antibiotics in the past or for patients in hospitals in which penicillin or the tetracyclines have been used excessively and thus their effectiveness against staphylococci and/or coliform infections because of organism fastness has been conceivably reduced. The value of the early attempts to detect and treat resistant enteric micrococci in patients who are about to undergo an operation for a colonic lesion is stressed.

Because the authors believe that systemic protection of the patient undergoing colonic surgery is of value, particularly in the initially grossly infected cases (diverticulitis, necrotic neoplasms), not to mention the infection that frequently may accompany any neoplastic lesion of the colon as evidenced by the frequent finding of nonmalignant mesenteric lymphadenitis, they are somewhat inclined to advocate the inclusion of an absorbable antibiotic, for the present at least.

Colostomy. MANUEL E. LICHTENSTEIN. *Surg. Clin. N. America*, 1955, 35: 1347.

IN GENERAL, a colostomy is usually the result of a deliberately planned operation in which an opening is made in the large bowel for one or more of the following reasons:

1. Decompression of the distended large bowel to prevent perforation.
2. Diversion of the fecal matter from the distal colon (a) to facilitate its preparation for resection or to make possible extensive surgery about the anus and perineum in selected cases, (b) to permit healing of injuries or to favor resolution of an inflammatory process in the distal colon.
3. Incidental to a colon resection done for injury, inflammatory or neoplastic disease, volvulus, or gangrene of a segment of colon.
4. Production of an artificial anus when the distal segment of the colon is removed.
5. Exteriorization of damaged bowel with perforation when immediate closure is unwarranted because of peritonitis, distention, or impending gangrene.

The classification of types is as follows: (A) colostomy in continuity: (1) external decompression, (a) active, (b) passive; (2) internal decompression, (a) active, (b) passive; (B) colostomy in discontinuity: (1) external, (2) internal; (C) colostomy with a spur: (1) with bowel resection and without bowel resection; and (D) colostomy on end.

Colostomy in continuity is done for decompression of the bowel with no design for complete diversion of the fecal stream. This type of colostomy is best illustrated by cecostomy which is made to relieve acute distention of the colon with impending perforation of the cecum.

Colostomy in discontinuity aims at complete diversion of the fecal stream with defunctionalization of the distal colon. Actual separation of the proximal and distal lumina makes this a certainty.

Colostomy on end is the artificial anus that remains following complete excision of the distal colon, rectum, and anus. It may be placed according to the practice of the surgeon and the available segment of bowel at a convenient place on the abdominal wall. It is best that it make its exit from the abdomen through a separate opening and not through the primary surgical wound. The opening in the skin is made by excising an ellipse of skin to provide a circular edge for attachment of the circumference of the colon at the stoma. The fascia is opened with a cruciate incision. It is important that the terminal bowel be long enough to protrude from the abdominal wall without tension and with no risk of retraction. Some surgeons exteriorize a long segment and divert the gas and feces away from the wound through a large catheter. At the end of 10 days to 2 weeks, revision of the stoma is done and the mucosa is sutured to the skin. Others open the stoma immediately on completion of the abdominoperineal resection and fix the bowel to the abdominal wall so as to avoid contamination of the layers below the skin.

The author discussed the local complications and sequelae succinctly and illustrated these very well. The interested reader should read the original article.

Lichtenstein stated that three factors are of importance in the care of the colostomy: (1) a constipating diet, (2) bowel habit time, and (3) irrigation for complete emptying of the bowel. Each is important, requires understanding and warrants a detailed explanation to the patient in order that the best results may be obtained. Instructions to the patient should begin in the hospital. —*Robert Turell, M.D.*

Further Experiences with the Treatment of Prolapse of the Rectum. W. A. ALTEMEIER, PAUL I. HOXWORTH, and JEROME GIUSEFFI. *Surg. Clin. N. America*, 1955, 35: 1437.

THE AUTHORS report their experiences with 21 cases of rectal prolapse treated by a one stage perineal procedure. There was no hospital mortality and only one recurrence. The authors emphasize that a true prolapse consists of an anterior sliding hernia, and that to insure successful repair a high ligation must be accomplished and followed by closure of the hernial defect.

Three types of prolapse are defined, and the operative procedure is described in detail. After a perineal approach only, the outer layer of bowel is circumferentially cut 3 millimeters proximal to the pectinate line and the prolapse is converted into a single loop. The hernial sac is then opened, the rectosigmoid pulled down, and the hernial sac closed as high as possible with an inverted Y-shaped closure. The anterior defect in the levator ani muscles is

closed next, and the excess bowel is excised. An end-to-end anastomosis is then done between the recto-sigmoid and the mucosa, 3 millimeters proximal to the pectinate line. Drainage is not employed. Only one abscess and one recurrence occurred in this series.

—John C. Carlisle, M.D.

Squamous Cell Carcinoma of the Anus. ROBERT S. GRINNELL. *Surg. Clin. N. America*, 1955, 35: 1289.

GRINNELL stated that although favorable results have been reported from some clinics using radiation therapy, there is considerable doubt among radiologists, surgeons, and pathologists as to whether radiation can destroy cancer in metastatic nodes, such as the perirectal and mesocolic, which are not easily accessible. On the other hand, radical surgery can be counted on to remove these nodes as well as the primary tumor, in most instances. For the same reason the author is opposed to radiation or local excision even in small lesions, as the small size of a tumor is no guarantee against metastasis—a point which needs the strongest possible emphasis because radiation therapy has not proved to be effective. Whether prophylactic excision should be done routinely is still an undecided question which cannot be determined until more information is available. Grinnell recommends it only if the nodes are enlarged or suspicious or the tumor is unusually extensive.

Abdominoperineal resection is the treatment of choice for carcinoma of the anus because radiation cannot be counted on to destroy lymph node metastases which may occur even in the smallest lesion. The upward lymphatic route to the perirectal and mesocolic lymph nodes is probably the most important and is amenable to radical surgery. On the basis of his experience reported in this article, Grinnell stated that the prognosis in carcinoma of the anus following surgery is more favorable than has been generally believed. *—Robert Turell, M.D.*

Epidermoid Carcinoma of the Anal Region; Inguinal Metastases. MAUS W. STEARNS, JR. *Am. J. Surg.*, 1955, 90: 727.

THIS ARTICLE is a review of 69 cases of epidermoid carcinoma of the perianal skin, anal canal, and rectum; the patients were admitted either as in-patients or out-patients to the Rectum and Colon Service of the Memorial Center for Cancer and Allied Diseases, New York, in the period from January, 1942 to December, 1952.

The primary neoplasms were treated by a variety of methods, primarily surgery with or without irradiation in the preoperative or postoperative stage. The surgical procedure varied from local excision for relatively small perianal lesions to combined abdominoperineal resection of the rectum accompanied by a meticulous abdomiopelvic node dissection.

The combined abdominoperineal resection of the rectum is routine as is also ligation of the superior hemorrhoidal vessels just below the left colic artery, wide removal of the peritoneum, wide perineal skin excision with complete removal of the ischiorectal fossa contents, and division of the levator muscles at their origin.

The abdominopelvic node dissection includes removal of the tissue from about the aorta, the vena cava, the iliacs (common, external, and internal), the obturator space, and the presacral and aortic bifurcation.

Forty of the 69 patients did not present clinically recognizable groin metastases. However, 29, or 42 per cent, did show metastases to this location. Moreover 16 of the 29 patients had obvious groin metastases at the time of admission. In 11, or 85 per cent, of the 13 with subsequent metastases, they appeared within the first 2 years of observation.

The study of surgical specimens tends to confirm two routes of spread from the anal region: (a) by the way of the perianal lymphatics or upper thigh directly to the superficial groin nodes, then to the iliac and obturator nodes; (b) by way of the internal iliac or obturator nodes and then possibly to the superficial groin nodes. Furthermore, the route by which malignant cells are borne to the groin more frequently appears to be the inferior route.

From this study it was concluded that treatment of patients with groin metastases is not satisfactory as the 3 and 5 year survival rates are 16.0 and 12.5 per cent, respectively. Moreover, of 17 patients in whom groin dissections were performed, 9 died of their disease in less than 3 years, 2 died after 5 years, 1 patient died of other causes without evidence of disease, and 5 patients are living free of disease from 2 to 6 years. None of the patients having groin metastases present on admission is among those still alive. If "prophylactic" groin dissections had been the practice in this series, 53 bilateral groin dissections would have been performed for the possible salvage of 3 patients who were not controlled by therapeutic groin dissection.

However, the method is not entirely useless as the presence of metastases to the deep pelvic nodes does not always mean a fatal outcome inasmuch as 4 of 5 patients who were subjected to removal of obturator or iliac node metastases by radical groin dissection are living and free of evidence of their disease from 2 to 6 years. *—Stephen A. Zieman, M.D.*

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Investigations with Radioactive Biligrafin (Untersuchungen mit radioaktivem Biligrafin). K. H. KIMBEL, W. BÖRNER, and E. HEISE. Fortsch. Roentgenstrahl., 1955, 83: 1.

AS AN experimental study 0.5 cc of biligrafin was injected into the tail vein of 11 albino rats. Biligrafin is a shadow-casting preparation for roentgenological work which normally contains more than 60 per cent iodine. For the purposes of the authors' studies a portion of the iodine ions in the original preparation was replaced with radioiodine I^{131}.

One of the animals died 30 minutes after receiving the injection; the others were sacrified in pairs, 2 each after 1, 2, 3, 5, and 7 hours. Table 1 shows the disintegration count for each fluid (urine, stomach, and intestinal washings) and tissue-homogenate (gastrointestinal tract, liver, kidney, lungs, heart, and fatty tissues). The figures in this table are not very revealing and not too consistent but they do show

trends which are of importance. For instance, 80 per cent of the intravenously injected biligrafin was found in the intestinal contents after 3 hours. At this time the disintegration in the tissues of the kidney, lungs, heart and fatty tissues began to diminish, so that at the end of 7 hours there was but meager evidence of disintegration activity anywhere except in the gastric contents and in the walls of the intestinal tract. This evidence points to the excretion of the disintegration-causing substance with the bile into the intestine. The evidence was further supported by the fact that the coefficient of its elimination was greater for the liver than for the kidney.

A considerable amount of the disintegration product in the gastrointestinal tract was present in the gastric contents where, barring regurgitation phenomena, bile would not be present, and in the walls of the intestinal tract. This would raise the question of the direct excretion of a part of the radioactive substance from the blood stream directly into the intestinal and gastric lumen.

In the clinical portion of the study, the level of the count in the blood stream, and the presence of disintegration-causing substance in the region of the liver, gallbladder, and the thyroid gland were followed concurrently by means of triply hooked-up scintillometers of the authors' own development. The simultaneous continuous recording of these regions showed an elimination of half-life level after 60 minutes from the blood and an increase of activity over the liver region. No increase of activity could be demonstrated after 12, 24, and 48 hours in the region of the thyroid gland.

In order to test the possibility of reabsorption from the intestinal canal and any possible effect which such a contingency might have on the results obtained, the duodenal tube was placed in the human subject and 20 c.c. of the biligrafin solution were instilled into the duodenal canal. Any resorption from the duodenum was then followed by scintillometer measurements over the duodenum itself (diminution of the count) and over the blood stream in a remote portion of the body (sole of the foot). Here also the action of the thyroid was watched simultaneously by means of a special scintillometer recording. The count rose immediately with the instillation of the substance into the duodenum; the activity over the region of the thyroid gland and the lower extremity was changed only for a short time by the material deposited by the duodenal tube. At this point the observations had to be interrupted for 8 minutes; for the following 30 minutes the activity in the thyroid and in the lower extremity remained unchanged. On the whole it appeared that no appreciable quantity of the biligrafin solution was absorbed from the duodenum into the blood stream.

For the testing of any evidence of resorption which was not demonstrable in the relatively brief period of observation the urine of the three test subjects was collected for a period of 24 hours following the instillation. The activity in these three specimens did not go higher than the statistical variations in the controls. The same may be said of the counts over the thyroid gland of these subjects in the period of 12, 24, and 48 hours following the intraduodenal instillation.

To corroborate the findings of Langecker, Harwart, and Junkmann (*Arch. exp. Path.*, Lpz., 1953, 220: 195), that between 87 and 88 per cent of biligrafin which has been added to human blood serum becomes nonultrafilterable, the authors attempted to determine to what fraction of the human blood plasma the biligrafin is bound. A definite amount of biligrafin in solution was mixed with 1 c.c. of human blood serum and then separated into its protein components by the paper-electrophoretic method of Grassmann and Hannig. In this process a current of 100 ma. for a 12-hour period was used. The zones assigned to the beta- and gamma fractions proved to be practically inactive scintillometrically; the alpha-globulin and albumin fractions showed the highest disintegration counts. Here there occurred a certain activity extending beyond the zone ascribed to the albumin fraction, but this activity is explained by the authors as belonging to the so-called prefractional count (Fig. 5 in original text).

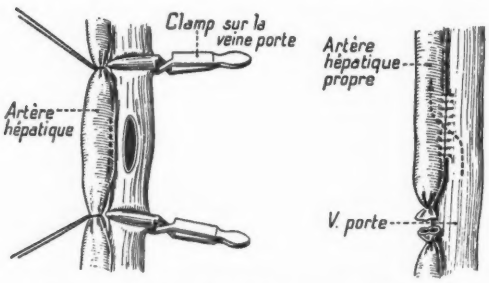
In a general consideration of the work on the experimental animal and on the human subject, the most striking finding would seem to be a discrepancy, viz., in the animal the excretion of the intravenously administered biligrafin into the urine attained, in 1 hour, 16.3 per cent of the administered total; in the human subject the same circumstances produced a urinary excretion of only 6.75 per cent. It is suggested that quantitative differences, as between the animal and the human, with reference to the matter of renal versus hepatobiliary excretion, may exist. —*John W. Brennan, M.D.*

A New Type of Portal to Systemic Venous Shunt for Portal Hypertension. H. William Clatworthy, Jr., Thomas Wall, and Robert N. Watman. *Arch. Surg.*, 1955, 71: 588.

Experimental and limited clinical experience with a previously unreported side-to-end portal-to-systemic venous shunt is presented. This shunt is designed primarily for those patients in whom the splenic and portal vein sites are unavailable for decompressive procedures.

This type of patients includes four groups in whom the established procedures are impossible: (1) the "postsplenectomy bleeder" with cavernomatous changes in the portal vein, (2) the patient with preexistent thrombosis and recanalization of the portal vein and its main tributaries, (3) the patient with excessive bleeding at surgery from periportal or perisplenic collateral vessels, and (4) the small child in whom the difficulties of obtaining an adequate-sized patent portal-to-systemic venous shunt may be almost insurmountable.

In each of such cases the problem is one of demonstrating and dissecting out a portal radicle of suitable size. With portal venography it is possible to demonstrate in such instances a dilated superior mesenteric drainage vessel or a large lake of blood at the confluence of the superior mesenteric and splenic veins. Decompression of the portal system can then be accomplished by bridging the gap between the dilated portal vessel and the inferior vena cava with a vein graft or by the technique described in the present article.



FIGS. 1 and 2 (Leger *et al.*) Schematic sketch of the technique of portalization of the hepatic artery.

In the experimental laboratory and in 2 clinical cases, the authors have performed an anastomosis between the side of the large superior mesenteric venous tributary and the divided proximal end of the inferior vena cava, with satisfactory decompression of the hypertensive portal venous bed.

The techniques used in 13 dogs and the results obtained are described. In addition, the case histories of 2 patients are presented in detail together with the operative technique and follow-up results. The advantages and disadvantages of this method are discussed.

—Robert Paradny, M.D.

Attempts at Surgical Treatment of Liver Cirrhosis; Critical Study of Portalization of the Hepatic Artery (Essais de traitement chirurgical des cirrhoses du foie; étude critique de la portalisation de l'artère hépatique). LUCIEN LEGER, GUY ALBOT, and LOUIS VAILLE. *Presse méd.*, 1955, 63: 1290.

THE AUTHORS of this article state that disturbances of the lymphatic circulation play an important role in liver cirrhosis. In laparotomies of cirrhotic patients they frequently observed enormous varices of the lymph vessels at the superior border of the pancreas. Lymphatic stasis and decompensation may go hand in hand with stasis of the portal vein. This may occur in cases with and without ascites. Possibly a certain degree of thrombosis or obliteration of the lymph vessels is necessary to produce ascites.

The role of gallbladder disturbances in the pathogenesis of cirrhosis is discussed. In practically all operations for cirrhosis the writers found a large whitish gallbladder with thickened walls, often with a large lymph node at the neck. The writers hypothesize that in certain individuals affections of the gallbladder are the prime factor in the development of cirrhosis of the liver.

As ligation of the hepatic artery is often unsatisfactory and has a high mortality of between 30 and 50 per cent, other surgical interventions have been done, namely:

1. Periarterial neurectomy. This operation aims at improving the function of the liver. The results are more encouraging than those of hepatic artery ligation. Another writer has reported 5 cases in which he performed a neurectomy because a cirrhosis was found in the course of a cholecystectomy. The results were satisfactory in all 5 cases.

2. Arterialization of the portal vein. This operation, implantation of the hepatic artery in the portal vein, has been performed only in animal experiments. Its purpose is to improve the supply of oxygenated blood to the cirrhotic liver.

3. "Portalization" of the hepatic artery. This operation, anastomosis between the portal vein and the hepatic artery with ligation of the afferent portion of the hepatic artery aims to combine the advantages of anastomosis with those of ligation of the artery. The distal end of the artery is anastomosed to the portal vein without interruption of the continuity of the latter. Saegesser, the inventor of this operation, presents the following theoretical arguments: In advanced cirrhosis the portal blood scarcely gets in contact with the liver cell as it is to a large part detoured by the collateral circulation. By the operation a closer contact between the portal blood and liver cell is accomplished, and the liver function is improved. Furthermore, interruption of the hepatic artery removes one cause of portal hypertension. In spite of the ligation, the blood supply of the liver and the drainage of the portal system are improved. Five patients, operated upon by Saegesser by this method showed definite benefit, with cessation of hemorrhages and of ascites. The portal pressure, taken before and after the operation, showed a marked drop.

The writers of the present article report in detail a case in which they performed ligation of the artery and arterioportal anastomosis because of liver cirrhosis with repeated severe hematemesis. Splenoportography had shown a marked reflux in the area of the inferior mesenteric and the coronary veins. Although the operation was technically successful, as proved by the autopsy findings, the hematemesis persisted, and the patient expired 3 weeks after the intervention.

The authors state that although the anastomosis remained patent it did not function because an artery cannot function at venous pressure and when it is deprived of the rhythmic sphygmic wave.

—Werner M. Solmitz, M.D.

Metastatic Cancer of the Liver; the Clinical Problem and Its Management. GEORGE T. PACK and RICHARD D. BRASFIELD. *Am. J. Surg.*, 1955, 90: 704.

THE INTERPOSITION of the liver in the anatomic pathways of circulation, as the portal venous, hepatic arterial and lymphatics, places it in the role of catchment basin for many cancer cells in transit. The enormous surface expanse of the capillary bed should be an efficient filter. The opinion has been often expressed that the ratio of primary to secondary cancers in the liver is approximately 1 to 20, but this reputed incidence must be grossly in error inasmuch as 25 to 50 per cent of all patients dying of cancer are found at autopsy to have hepatic metastases.

The original cancer may be so small as to be asymptomatic or even to defy discovery by the surgeon at exploratory laparotomy. Bulky metastases in the liver may be secondary to primary cancer hidden in remote organs.

Most metastases in the liver are circumscribed growths, not commonly infiltrative. These secondary deposits seem to occur more frequently near the surface of the liver rather than in its depth. With the

expansile growth of these nodules, central necrosis or degeneration of the core may occur with resultant fibrosis and contraction, thus producing the pathognomonic umbilication of metastatic cancer. Calcification seldom occurs but internal hemorrhage and cavitation of these spherical masses of metastatic cancer is sometimes seen. The consistence of the masses depends upon the proportion of connective and vascular tissues present in their substance. The metastases may occupy so much of the liver and compress the adjacent normal liver tissue to such an extent that at autopsy the quantity of healthy liver is barely visible and one wonders how the condition could have been compatible with life.

Metastases in the liver do not have the well developed capillary stroma which characterizes primary hepatomas: the metastatic cancers have a more intimate relation with the portal venous system through which the tumor emboli are afferently transported. The less frequent pattern of hepatic metastasis is the ill defined diffuse infiltration of the entire liver which may not cause nodularity, distortion of contour, or increase in weight of the organ. It is found usually in patients with mammary cancer or malignant melanoma. In contradistinction to cancer in other organs, hepatic metastases seldom extend beyond the confines of the liver to invade adjacent structures.

Cancer emboli destined for deposit in the liver reach this organ chiefly by way of the portal vein. Primary cancers of the viscera or tissues in the portal region of venous drainage, such as the lower esophagus, stomach, gallbladder, pancreas, small intestine, colon, and rectum are the common sources of such emboli. Cancers metastatic to these viscera may drain secondarily into the liver.

When hemic metastases occur from any cancer, arterial borne secondary deposits in the liver are always possible. The usual source of hepatic arterial metastases is the lung, wherein the cancers may be primary bronchogenic or metastatic to the lung, as, for example, renal, mammary, and testicular cancers. Extension of cancer to the liver via the lymphatics is probably uncommon; one seldom sees lymph vessels permeated by cancer except in the immediate vicinity of massive metastases.

Direct invasion of liver by contiguity is possible as well as intrahepatic dissemination of metastases. The manner of intrahepatic redissemination is identical for primary hepatomas and metastatic cancer.

As for the course of metastatic cancer in the liver, it may be said in general that secondary tumors in the liver grow far more rapidly than the primary cancers. The deposits in the liver frequently exceed the primary cancer in bulk. The hepatic metastases may continue to enlarge while the original cancer in the stomach, bowel, breast or pancreas remains small and inconspicuous.

A differential diagnosis between primary and metastatic tumors in the liver can usually be established by a historical review and careful physical examination. A history of earlier excision of visceral cancer in the portal area, breast, or eye, or the known presence of concurrent primary cancer in addition to the liver enlargement, is sufficient basis on which to assume that a nodular liver contains metastasis. Without this information every effort should be made by physical, endoscopic, and roentgenologic examinations to ascertain if primary cancer elsewhere is detectable before assuming that a nodular liver indicates a hepatoma. Recourse to biopsy by the aspiration technique or through a small exploratory incision, or peritoneoscopic study may solve the problem. Cirrhosis is a more constant accompaniment of primary liver cancer, and jaundice is caused to a greater degree by metastatic cancer.

Serum alkaline phosphatase determination and the bromsulphalein test are useful in the diagnosis of metastatic cancer of the liver, and portal venograms (usually splenoportal venograms) have been most commonly employed in patients with portal hypertension to determine the exact location of the obstruction—whether it is intrahepatic or extrahepatic. Hepatic metastases may be detected by selective concentration of radioalbumin.

The technical problems involved in the surgical treatment of metastases in the liver are the same as for primary tumors. The controversial issue is whether or not to treat any hepatic metastases, in view of the incurability of this state. At the moment the question is not so much concerned with cure as with the hoped-for palliation by such treatment. Recent improvements in the surgical management of liver diseases encourage attempts to extend the palliation of cancer by such experimental surgery as metastasectomy and partial and total hepatic lobectomy.

—*Stephen A. Zieman, M.D.*

Choledochojejunostomy—Its Ability to Control Chronic Recurring Pancreatitis. RALPH F. BOWERS. *Ann. Surg.*, 1955, 142: 682.

CHOLEDOCHOJEJUNOSTOMY has been used by the author and his associates for the past 7 years in an endeavor to control chronic relapsing pancreatitis, recurrent acute pancreatitis, or recurrent calcareous pancreatitis, with good early control. No case was subjected to choledochojejunostomy if the gallbladder or common duct showed pathologic changes at the first operation. Cholecystectomy, exploration of the common duct, removal of common duct stones, and instrumental dilatation of the sphincter of Oddi were done initially, followed by an observation period of about a year. If the attacks of pancreatitis continued and it appeared that the attacks would persist in the future, then choledochojejunostomy was performed in all cases, except if there was evidence of extensive pancreatic insufficiency as revealed by marked diabetes, steatorrhea, weight loss, etc.

The rationale for the use of the procedure is based upon the concept of bile regurgitation under pressure into the pancreatic duct, which can occur without a common channel. If prevention of bile regurgitation is a desirable state for control of this disease, then a shunt procedure accomplishes more accurate control than sphincterotomy and does so permanently. Any etiologies which do not involve bile regurgitation, or possibly spasm of the sphincter of Oddi, will not permit control by this operation. Psychosomatic conditions and calcifications or calculi of the pancreas are not indications for the procedure. The operation requires cutting across the common duct, creates the

loss of neutralization from the duodenum, and is a more extensive procedure than sphincterotomy.

There was no mortality in the 14 cases reported in this paper, and only one patient presented cholangitis on the basis of a common duct stricture. Peptic ulcers have not appeared in any postoperative roentgenograms and it is very important that a careful examination of the patient's upper gastrointestinal tract be made both preoperatively and at the time of contemplated choledochojejunostomy.

There were 2 cases of pseudocyst formation. In one of these, treatment by cystgastrostomy was carried out and in the other, located in the head of the pancreas, drainage was accomplished via an opening in the distal common duct remnant.

Of the 14 patients, 12 have received perfect control of pancreatic attacks. Amusingly enough, a deterrent to the operation is an acceleration of alcoholic consumption because of the ability of the upper gastrointestinal tract to "take it." The two failures include a patient with a few mild attacks yearly, with elevated serum amylase readings, and a codeine addict whose pain is relieved by the administration of one-half grain of codeine and whose amylase readings are low. —*James H. Holman, M.D.*

MISCELLANEOUS

Nonperforating Wounds of the Abdomen. JAMES T. HELSPER. *Am. J. Surg.*, 1955, 90: 580.

FIFTY-TWO PATIENTS with nonperforating abdominal injuries were observed at the Queens General Hospital in New York, during the 5 year period from 1948 to 1952. All perforating abdominal injuries were eliminated because of their more obvious indication for surgery and management.

The causes of injury in the author's group of 52 cases were automobile-pedestrian accidents (26), falls (11), automobile collisions (5), sleigh accidents (3), brawls (2), a boat-swimmer accident (1), a fall from a horse (1), and a bicycle accident (1).

The diagnosis of the abdominal conditions only were ruptured spleen (17), retroperitoneal hemorrhage (12), contused kidney (10), ruptured bladder (7), lacerated liver (5), perforated ileum (3), hemorrhage of the abdominal wall producing peritoneal irritation (3), lacerated pancreas (1), laceration of the mesentery with gangrene of the bowel (1), ruptured right diaphragm with herniation of the liver into the right chest (1), and contused bladder (1). Some of the patients had more than one diagnosis of the abdominal condition. The one most often given with others was retroperitoneal hemorrhage.

All of the genitourinary injuries are included as a single group comprising 19 patients, 2 with contused kidneys, 7 with a ruptured bladder, 2 with a ruptured kidney, and 1 patient with a contused bladder; in one of the patients both a ruptured bladder and a contused kidney were present. There were 5 deaths in this group, all in patients presenting additional injuries.

The method of injury, the diagnosis, management, and sequelae are discussed, and it is considered that a system of management which includes early and frequent examinations with full use of all the diagnostic aids is of paramount importance. Early institution and judicious use of the general supportive measures, intravenous fluids, blood, oxygen, emptying of the stomach, intubation, catheterization, rectal examination, antibiotics and analgesics, must be carefully considered in all cases and resorted to when indicated.

Surgery should be performed in all cases in which the indications are present and as soon as the patient's condition permits. The problem of surgery is usually fairly clear and, as long as the principles of good surgical judgment are followed, the results should be satisfactory. It is emphasized that adequate exposure for complete exploration is of obvious importance. Some of the more bizarre conditions resulting from nonperforating abdominal injuries are discussed.

—*John H. Mohardt, M.D.*

GYNECOLOGY

UTERUS

On the Origin and Development of Uterine Fibroids. NORMAN F. MILLER and PETER P. LUDOVICI. *Am. J. Obst.*, 1955, 70: 720.

THE AUTHORS discuss briefly the literature on the etiology of uterine leiomyomas and report in detail the most recent improvements they have made in their technique of tissue culture from the myometrium, from the leiomyomas themselves, and as a control from the rectus fascia. Using the roller-tube method of Gey, the authors have developed a technique by which tissue is cultured with regular success.

The tissues so cultivated have been studied in a microscope-slide perfusion chamber of their own design which permits both motion and still photography under a variety of test conditions with alteration of the fluid medium. By this method the authors have confirmed their previous observation that the only significant differentiating characteristic of muscle cells is the presence of linear striation, which they consider to be identical with the so-called myofibril.

An attempt was made to identify myoglobin by infra-red spectrophotometric analysis but these studies were inconclusive. An attempt to produce contraction of the cells cultivated in order to differentiate accurately between fibroblasts and myoblasts did not demonstrate a clear-cut difference in behavior between cells so identified on morphological grounds. A number of stimuli to contraction were used in the course of these experiments, including adenosine triphosphate. Contractions were noted and recorded photographically but a significant difference in action between cells that were thought to be fibroblasts and those that were thought to be myoblasts could not regularly be demonstrated.

In summary, the authors present a readily reproducible technique for tissue cultivation of cells from the uterus, from leiomyomas, and from muscle fascia. A morphologic difference between fibroblasts and myoblasts is easily demonstrable. Other techniques for differentiation between these two categories are suggestive but not positive. Further studies of tissue so cultivated are in progress, and particular attention is being given to those substances which, when added to the culture medium, either accelerate or restrain the rate of cell growth.

—*Howard Ulfelder, M.D.*

Statistical Problems Concerning Errors Associated with the Vaginal Smear in the Early Diagnosis of Cervical Cancer (Problèmes statistiques des erreurs apportées par les frottis vaginaux dans le diagnostic précoce du cancer du col). R. MORICARD. *Gyn. obst.*, Par., 1955, 54: 294.

THE GENERALIZED USE of a new diagnostic tool without careful interpretation of the results may produce a considerable discrepancy between the laboratory conclusions and clinically observed facts. This situation has arisen through the use of Papanicolaou smears. Publications from Danish and French sources in the study of large populations have shown that the expected morbidity for cervical cancer should be less than 100 per 100,000 women per year. In contrast with this, the figures mentioned by colpocytologists suggest a morbidity up to 2,000 per 100,000 women when examined with Papanicolaou smears.

There seem to be several reasons for these wide differences in the statistics. Cytologic criteria are far from being established. Benign hormonal conditions, dysplasias, and infections produce cells which cause the cytologist to interpret smears from type 3 as type 5. The most common sources of error are the elongated or multinucleated cells, hyperchromatic nuclei, and gigantic nuclei. Abnormal cells may be rapidly recognized by a well trained technician, but the interpretation of the source and nature of the cells poses an entirely different problem. The examiner may be unduly influenced when he sees both smear and biopsy specimens. This is the usual procedure in most clinics. When the cytologic and pathologic evaluations are made by separate individuals there tends to be a greater number of false positive smears.

Actually, the value of a smear depends upon the anatomic criterion that defines the microscopic appearance of noninvasive cancer. Great care must be taken in delineating the boundaries of benign dystrophies, invasive cancer, and carcinoma in situ. A detailed classification of the gross and microscopic characteristics of benign and malignant lesions is provided by the author. Intraepithelial cancer is defined as cellular proliferation involving the entire epithelial layer with multiple anomalies of mitoses, especially in the metaphase, and with loss of differentiation. There is no involvement of the connective tissue, and there is marked diminution or absence of glycogen. A marked increase in the number of mitoses throughout the full epithelial thickness, and abnormalities either in position or in the number of chromosomes are probably the most outstanding findings that establish the diagnosis of cancer. Few publications dealing with cytology discuss the comparative biopsy findings. Those that do mention them may be criticized for interpreting cellular changes associated with dysplasias, especially basal cell hyperplasia, as characteristics of cancer.

The report includes the results of a comparative study of 12,658 women at the Broca Gynecologic Clinic, Paris, France. After grossly obvious cancer was eliminated, 47 invasive or noninvasive cancers were discovered by colposcopy, colpocytology, and biopsy after a thorough pelvic examination including a Schiller test of the cervix. The use of colposcopy and the Schiller test permitted an accurate localization of biopsy sites and thus reduced the number of biopsies required. In the absence of such aids a four quadrant biopsy should be done. The Papanicolaou smear and biopsy were performed concurrently in 322 patients. The Papanicolaou smear did not appreciably (less than 1%) increase the diagnostic accuracy of the bi-

opsy; in addition, it did not permit the discovery of dystrophies noted through the aid of biopsies.

The smear presumably should be of aid in the detection of endocervical cancer not visible in the portio vaginalis. Such lesions are extremely rare; the effort and anxiety expended to discover them is out of proportion to the meager results. The only value of the smear seems to be in the follow-up of treated cervical dystrophies. The occurrence of a positive smear after treatment of cervical dystrophy would indicate a repeated search for the source of the abnormal cells. Great care must be taken in the application of the Papanicolaou smear. False positive smears lead to the belief that the incidence of cervical cancer is higher than it really is and they cause the therapist to perform radical treatment for nonexistent cancer.

—George C. Lewis, Jr., M.D.

Researches in the Diagnosis of Female Genital Cancers by the Vaginal Smear; the Diagnosis of Epitheliomatous Lesions of the Uterine Cervix During Pregnancy (Recherches sur le diagnostic des cancers genitaux feminins par les frottis vaginaux; le diagnostic des lesions epitheliomateuses du col utérin au cours de la gestation). J. VARANGOT, V. NUOVO, and S. VASSY. *Gyn. obst.*, Par., 1955, 54: 261.

THE DISCOVERY of cervical cancer during pregnancy has been reported to be rare, i.e., from 0.35 to 0.5 per 1,000 births. In order to evaluate the incidence of this condition during pregnancy and the puerperium, 1,953 pregnant women were examined by means of the Papanicolaou smear at the Port Royal Maternity Hospital in Paris. The group was not completely unselected because a few patients were seen after referral for suspicious lesions or symptoms.

The smears were typed according to the Papanicolaou system. Twenty-nine patients had type 4 and 29 had type 3. A histologic evaluation was made to establish the diagnosis of cancer in 21 patients, an incidence of 0.66 per cent. Twelve with type 4 were found to have invasive cancer and 9 with type 4 had cancer in situ. The type 3 group presented 1 noninvasive lesion which was revealed by a postpartum smear. The difficulties of smear interpretation were found to be no different from those encountered in nonpregnant patients, except for the potential errors introduced by the presence of trophoblast cells. These cells were found only in postpartum smears and resulted in classifying 13 cases as belonging to type 3. Case summaries were given for all the cancers found by the smears. The average age of the malignant patients was 33.8 years. Their parity was 4.8. In the same clinic, the average age was 25.5 years and the parity 2.4 for the normal obstetrical case.

One-fourth of the cases reported as invasive were, for the most part, noninvasive with limited microscopic zones of questionable invasion. One patient could have been diagnosed from the history and 3 patients from the gross appearance of the cervix. Biopsy during pregnancy carried no unusual risk. When a positive smear was not confirmed by a point biopsy, cone biopsies with serial section were utilized successfully.

It may be concluded from this study, even though it is not entirely a random sampling, that the incidence of cancer during pregnancy is higher than is generally suspected.

Several months' or a year's delay in the diagnosis and therapy of cervical cancer may be avoided by careful inspection of the cervix during the prenatal course. All suspicious lesions should be biopsied. Vaginal bleeding indicates a thorough investigation of the cervix before a benign etiology may be assumed. If these steps are followed many lesions will be discovered during gestation instead of long after delivery.

—George C. Lewis, Jr., M.D.

The Place of Radiation Therapy and of Surgery in the Treatment of Uterine Cancer. H. L. KORTMEIER. *J. Obst. Gyn. Brit. Empire*, 1955, 62: 737.

THERE IS NO DOUBT that efficient surgical treatment, when attempted only in suitable cases and by skilled surgeons, gives a relatively high percentage of cures with a very low mortality rate—below 1 per cent at leading centers (Meigs, 1954); however, the incidence of complications is still high (Narik and Kojer, 1951). Bladder fistulas, rectovaginal, and particularly ureterovaginal fistulas occur in 9 to 14 per cent of the patients operated upon at centers particularly interested in the surgical approach.

As far as radiotherapy is concerned, the evolution of the treatment is progressing along the following lines at the Radiumhemmet:

1. Careful examination including cystoscopy, urography, and sometimes phlebography.

2. Usually, a fractionated intracavitary radium treatment is given as the first step of the irradiation. The treatment is individualized with regard to the degree of infection, the gross anatomic type of the tumor, its spread to paracervical or paravaginal tissue, and the area of the obturator fossa. Due regard is paid to the dosage distribution both from the intrauterine and the vaginal radium. Several types of intrauterine and vaginal applicators are used.

3. Roentgen therapy to the parametrium and the pelvic wall is given in all cases and, in selected cases, also to the paravaginal tissue through perineal fields.

4. Radioactive colloidal gold is injected into the parametrium in selected cases of suspicious lymph node metastases, in agreement with experiments carried out by Allen, Sherman, and Arneson (1954).

5. Additional treatment with telecobalt is applied in selected cases of cancer of the cervix with pelvic lymph node metastases as far as such lesions can be diagnosed by phlebography, urography, and clinical examination.

Injuries such as ulcers, necroses, and fistulas should not occur except in the rare cases in which the nature of the tumor makes such injuries predictable. The incidence of such radiation damage is 0.9 per cent of injuries to the bladder, and 1.0 per cent of injuries to the rectum. These figures correspond to those reported by other centers.

When the results of 12 leading institutions favoring surgery are pooled and compared with those of 28 institutions favoring radiotherapy, the 5-year results obtained by radiotherapy for stages 1 and 2 lesions are definitely better than those reported for surgery. It has been claimed by many of the proponents of surgery that the number of late recurrences after

surgery is less than after radiotherapy. Examination of 10-year cure rates does not support this.

In Kottmeier's opinion, individualized radiotherapy is the primary treatment of choice in carcinoma of the cervix, but even if we cannot accept surgery as the primary treatment, it is a great aid in the treat ment of lesions which fail to respond to radiotherapy, in recurrences, or in lesions which can be shown by some reliable method to have a small chance of being radiocurable.

Surgery has been advocated as being superior to irradiation in cases of cervical cancer coexisting with large fibroids, salpingitis or pregnancy, in cases of adenocarcinoma, and because some authorities claim that destruction of cancer in lymph nodes deep in the pelvis by irradiation is impossible. Kottmeier's results with radiotherapy in adenocarcinoma and in cases of cancer complicating pregnancy are superior to the best presented by surgeons.

Radiation therapy must destroy regional node metastases in some patients and radiotherapy offers a chance at least as good as surgery to cure patients with lymph node metastases. —*Alan Rubin, M.D.*

Complications of the Upper Urinary Tree Following Radium and Roentgen Therapy for Cancer of the Uterine Cervix (Complications urinaires hautes après Curie et roentgenthérapie pour cancer du col utérin). J. E. MARCEL and G. MONIN. *J. urol., méd.*, Par., 1955, 61: 249.

FOUR INSTANCES of disturbance of the upper urinary tract after radium and roentgen therapy are reported. Only the most typical instances are given.

The first case was that of a 45 year old woman with cancer of the cervix in stage 3. She was treated at l'Hôtel-Dieu by radium and then by roentgen therapy. With the second dose a cystitis appeared and with the fourth a progressive oliguria developed. After the fifth treatment anuria was observed and, since several attempts to catheterize the ureters proved futile, a nephrostomy had to be done, first on the right side and then on the left. Descending pyelography through the nephrostomy opening revealed impermeability of the pelvic ureter.

The second case was, again, that of a woman of 45 years of age. The cancerous process was also stage 3. Curie therapy and then roentgen therapy were administered. Two months after the initial placement of the radium a persistent cystitis developed. Some months later there was a total functional loss of the left kidney and a marked condition of ectasis of the right upper urinary tract.

The third case was that of a 49 year old woman with cancer of the uterine cervix in stage 1; radium therapy was given and followed by total hysterectomy. Ten months later colicky pains developed in the left kidney. Urography revealed a kidney on the right side that was excluded by reason of complete obstruction of the ureter from a point 5 cm. from the meatus. On the left side there was an ectasia of the pelvis of the kidney and a tight stenotic condition of the juxtavesical portion of the ureter. A no. 8 catheter was passed with difficulty. There has been considerable morphologic and functional amelioration of the stenotic condition by means of progressive dilatation with inlying catheters. Incidentally, ACTH was administered. The voluminous ureterohydronephrosis on the right side—shown by retropneumoperitoneum, is yet to be attacked.

The fourth case was that of a 55 year old woman with cancer of the cervix in stage 2. Radium therapy was carried out and then roentgen therapy. Ten years later there was present an elevated azotemia, fever, incontinence, total absence of elimination on urography, chronic urinary bladder retention, and bilateral stenosis of the intramural portion of the ureter bilaterally as a result of vesical sclerosis. The cervix was resected and dilatation of the ureter was carried out by means of an indwelling catheter. The body temperature returned to normal, the incontinence disappeared; the azotemic titer began to go down and some months afterward the urographic elimination was re-established. This improvement has now been maintained for 4 years, the patient being catheterized regularly every 2 days.

The authors have the impression that the roentgen therapy is responsible for the acute anuric complications; the radium therapy seems more particularly responsible for the latent and late-appearing complications which are especially prone to lead to a progressive destruction of the kidney.

In order to avoid these complications, or at least to reduce their pernicious effects, it is indispensable to make a preliminary survey of the condition of the urinary tract; urography, systematically carried out, is the best method of diagnosis. Control examinations should be continued during the subsequent months, or even years, to avoid, by means of dilatation, the development of irremediable renal insufficiency or the necessity of measures of urgency (nephrostomy). —*John W. Brennan, M.D.*

ADNEXAL AND PERIUTERINE CONDITIONS

Masculinizing Tumors of the Ovary; Anatomopathologic Study (Tumors males de l'ovarie; étude anatomo-pathologique). PIERRE LAFFARGUE. *Presse méd.*, 1955, 63: 959.

EVER SINCE Robert Meyer, in 1930 (*Zschr. Geburtsh.*, 1930, 98: 149), pointed out the need of recognizing masculinizing tumors of the ovary as a special variety, such tumors have been considered as arising from embryonic sources, or as taking origin in some form of teratoma. Since it has become known that the ovary normally secretes some androgens, it would seem unnecessary to contemplate such an origin, and the author prefers to consider the masculinizing tumors, or arrhenoblastomas, as arising in the same manner as the feminizing tumors of the ovary (lutein cell tumors, granulosa cell tumors, theca cell tumors, etc.) and he accords them the same origin in the polyvalent cells of the embryonic genital ridge.

The first test of the functioning of the masculinizing tumor is the male transformation in the woman harboring the tumor, and her re-feminization following removal of the neoplasm. When a masculinizing tumor of the ovary is reported as theca cell tumor, there can be no doubt of its masculinizing properties, but it is believed that such growths are not true theca cell tumors but atypical forms of arrhenoblastoma.

The author believes that there are masculinizing tumors which may be considered as arising from the genital blastema of the embryo. These tumors may contain epithelial structures (Sertoli cells and Leydig cells) and the greater or lesser predominance of these two kinds of cells comprise the different varieties of arrhenoblastomas. There are mixed forms and pure forms. The mixed forms are poorly differentiated (not masculinizing), and the pure forms are generally more highly differentiated; the pure Sertoli cell tumors are masculinizing to some extent because the interstitial cells of the stroma, however small the amount, are able to produce androgens, while the pure Leydig cell tumors are markedly masculinizing. The Leydig cell tumors are frequently diagnosed as ovarian sarcoma and the tumors with a predominance of Sertoli's cells are easily mistaken for theca cell tumors or granulosa cell tumors.

The more or less close resemblance between the different forms of neoplasm, and the confusion resulting therefrom may be explained by the assumption that the ovary normally contains androgenic cells which become pathologically manifest as either a hyperplasia or a neoplastic transformation of these elements. —*John W. Brennan, M.D.*

EXTERNAL GENITALIA

The Present Treatment of Vesicovaginal Fistulas (Le traitement actuel des fistules vésico-vaginales). Maurice Dossogne and Pierre Vanwelkenhuyzen. Acta urol. belg., 1955, 23: supp. 1.

Every phase in the management of vesicovaginal fistulas, from the preoperative diagnosis and preparation to the postoperative care, is considered. Modern authorities were questioned as to their techniques, and the published data in regard to this problem were studied; many variations in therapeutic methods were disclosed. All of those questioned seemed to accomplish the same favorable results. The outstanding factors for success were thorough knowledge of a single procedure by any given operator, adequate use of radiographic aids, the generous use of antibiotics, transfusions and hormones, and meticulous attention to the patient's condition.

Vesicovaginal fistulas were classed as simple, periurethral, and periureteral. Simple fistulas were usually corrected transvaginally. Those found high in the vagina were closed by transvesical surgery. This approach was generally used for the periureteral fistulas. The periurethral fistulas were repaired by transvesical or combined techniques. With transperitoneal closure, advocated by a few authors, there appears to be too great a risk of bacterial contamination of the peritoneum. In all cases, a three-to-four-month interval should be allowed to elapse before surgery. In a few instances of small fistulas spontaneous closure may occur. Local applications of cautery may also provide closure and thus avoid more extensive surgery.

In the transvaginal approach, adequate visualization is essential. Lateral or median colpotomy will provide good exposure and help lessen the tension on the sutures closing the fistula. The vesical and vaginal walls must be separated about the fistula. The bladder should be inverted with several layers of stitches. Dead space should be avoided by leaving the vaginal mucosa open or by inserting other tissues such as peritoneum, omentum, or bulbocavernosus muscle. When large fistulas are to be repaired a collar of vaginal mucosa can be infolded toward the bladder, or pedicle grafts may be employed. Sutures in the bladder must be absorbable. Vaginal sutures may be of this type or nonabsorbable. Bladder drainage in such fistulas is usually accomplished by a urethral retention catheter.

Periurethral fistulas may be closed by techniques similar to those employed for simple fistulas. In many cases the bladder may be completely closed, with drainage accomplished by suprapubic cystostomy. The urethra is then repaired or reconstructed with the use of a tubular pedicle graft. Later, normal flow is accomplished by inserting a trocar through the urethra to puncture the bladder. Continence is established by the vesical musculature or a subsequent sling operation.

Periureteral fistula closure must be preceded by a thorough evaluation of upper urinary tract function. In a few cases, repairs may be accomplished by inversion of the bladder wall and ureteral meatus. In the majority of cases, ureteral function can only be preserved by transplanting or anastomosing the ureter to the bladder in a healthy tissue zone. This is done by the transvesical route. The fistula is repaired by this same approach and drainage is accomplished through a suprapubic opening.

Details are given for the procedures followed at the Gynecologic School at Amsterdam, Holland, and the Lariboisière Hospital in Paris. Replies to a questionnaire from several surgeons are discussed in a special section of the article. —*George C. Lewis, Jr., M.D.*

Noninvasive Malignancy of the Vulva; Program for Management. Conrad G. Collins, Jack Kushner, George N. Lewis, and Roger Lapointe. *Obst. Gyn.*, 1955, 6: 339.

The authors present their tenets in the diagnosis and treatment of vulvar carcinoma. In addition to biopsy, all ulcerative lesions should have a minimal diagnostic survey consisting of (1) dark-field examination of scrapings from the lesion for the presence or absence of Treponema pallidum, (2) smears for Donovan bodies, (3) Frei's test for lymphopathia venereum, (4) smears for Ducrey's bacillus, and (5) a serologic test for syphilis. If invasive carcinoma is present on biopsy, radical vulvectomy and bilateral dissection of the inguinal, femoral, external iliac, hypogastric, obturator, and common iliac arteries, and Cloquet's nodes should be performed. If there is invasion of the bladder or the rectum, anterior, posterior, or total viscerectomy should be added to the procedure.

If biopsy shows malignant changes limited to the epithelium, then radical vulvectomy is performed and the whole vulva presented to the pathologist for multiple sections and study. Regional gland dissection is not necessary for a true, preinvasive carcinoma.

Nine of 93 cases of vulvar carcinoma seen during the period from January 1, 1946 to January 1, 1955 were preinvasive and were managed by complete (radical) vulvectomy alone. One patient died postoperatively of pulmonary embolism. The others have survived from 22 months to 5 years. There has been no recurrence. —*Warren R. Lang, M.D.*

Primary Carcinoma of Bartholin's Glands; Review; Report of a Case. EDWARD J. DENNIS, III, LAWRENCE L. HESTER, JR., and LESTER A. WILSON. *Obst. Gyn.*, 1955, 6: 291.

THE PRESENT REPORT of a case of carcinoma of Bartholin's gland is the one-hundred and fourteenth reported case, and the first one to be reported as being associated with pregnancy.

This 25-year-old multipara was first seen in the seventh month of her pregnancy. Early in pregnancy she complained to her family physician about a tender, painful lump in the left labium. Antibiotics were given. Slight improvement occurred with each course of treatment. Six months later she was referred to the cancer clinic for diagnosis and treatment. At this time a firm, fixed mass, 5 cm. by 2 cm., was found in the left labium majora with a surrounding area of induration.

Biopsy of this mass revealed a low grade carcinoma arising in Bartholin's glands.

At the thirty-sixth week of pregnancy a low cervical cesarean section was done. The baby, weighing 2,325 gm., was in good condition. The postoperative course was uneventful.

Three weeks later a radical vulvectomy was done without complications. Two weeks following vulvectomy, a bilateral groin dissection was done. There was no evidence of neoplasm in the nodes.

Recovery followed a bout of infection of the urinary tract. At a follow-up study, 4 months later (August, 1954), the patient was found to be in good health.

—*John R. Wolff, M.D.*

MISCELLANEOUS

Comparative Cytologic and Colposcopic Investigations (Vergleichende zytologisch-kolposkopische Untersuchungen). H. MUTH. *Geburtsh. & Frauenh.*, 1955, 15: 907.

MANY DISCUSSIONS have appeared in the literature as to whether cytology or colposcopy is more efficient in the diagnosis of early cervical cancer. Although most authors advise the use of both methods whenever possible, the majority favors the cytologic method as superior if only one is to be used.

The author studied various benign cervical changes by cytology and colposcopy. In so-called portio "erosion" atypical cells were found in 11 per cent (43 of 393 cases). When, of these cases, 61 cases of ectopia (a rim of pure columnar epithelium noted colposcopically around the external os) were evaluated, 5 per cent (3 cases) demonstrated abnormal cells cytologically. With a transformation zone (a mixture and mingling of squamous and columnar epithelium around the external os) 14 per cent (13 of 96 cases) showed abnormal cells. In 53 cases of atypical colposcopic findings, but with no suggestion of malignancy (true leukoplakia, ground leukoplakia, mosaic leukoplakia, abnormal blood vessels, true erosion), abnormal cells were noted cytologically in 32 per cent (17 cases).

In the study of 415 cases of apparently benign erosion, cytologic examination missed two of twelve preclinical carcinomas, while colposcopic examination detected all of them. Colposcopy was more helpful in the detection of atypical epithelium, a possible precursor of carcinoma. Six of 415 cases (1 per cent) were found on cytological study and 10 of 222 cases, (4.5 per cent) on colposcopy. Among 276 cases of known cancer, there were 19 with false negative results (6.8 per cent). There were no false negative results on colposcopy.

The author believes that with carcinoma in general, one can expect more false negative results with cytology while colposcopy yields more false positive results. The best and most complete results will result from the use of both methods. —*Warren R. Lang, M.D.*

Cytodiagnosis of Ascitic Fluid with Malignant Abdominal Tumors (Zur Zytodiagnostik der Aszitesflüssigkeit bei malignen Abdominaltumoren). HORST SMOLKA. *Geburtsh. & Frauenh.*, 1955, 15: 735.

ASCITIC FLUID from 52 women was studied cytologically after staining by the Papanicolaou method. Forty-eight of the 52 patients were operated upon. Of these, 36 were found to have spreading malignant tumors; benign lesions (mostly hepatic cirrhosis) were found in the remaining 12 patients.

Of the 36 patients with malignant tumors, 27 had positive, 4 had suspicious, and 5 had negative smears. All 12 patients with nonmalignant lesions had negative smears. The 4 patients who were not operated upon had negative smears. Cytologic diagnosis is therefore of definite value in detecting malignancy as a cause of ascites. —*Warren R. Lang, M.D.*

The Specific Treatment of Thromboembolism in Obstetrics and Gynecology (Die spezifische Behandlung der Thromboembolie in Geburtshilfe und Gynaekologie). H. MEIXNER. *Wien. med. Wschr.*, 1955, 105: 561.

THE AUTHOR'S STUDY comprises a personal experience with 128 patients who were given specific treatment since 1952 at Innsbruch, in Austria. There was only one death from pulmonary embolism among 3,000 births, but the instances of thromboembolism in both the gynecological (5,304 cases) and obstetrical material comprised a sizable percentage of the total; here the results were all favorable.

From results obtained by the author, and a study of the world literature on this subject, it is concluded that in order to lower the mortality and morbidity from thromboembolism and pulmonary embolism the diagnosis must be made as early as possible and specific treatment begun immediately. On the first suspicion of thrombosis the physician is notified at once; a few hours may be enough to decide the course and result of the disease.

From experience gained on the author's service, preference is given to the adequate administration of liquemin over a period of 5 days, accompanied by early mobilization of the patient. After this initial period of therapy with the heparinlike preparation, the treatment is continued with tromexan or dicumarol. Bleeding has not been an important factor, since in the gynecological cases the thrombotic disease did not usually appear until after the healing wound was free from the menace of hemorrhage; in the obstetrical patients the danger of serious bleeding is not present in the absence of serious injury of the birth passages.

Special emphasis is placed on the problem of prophylaxis. Prophylactic treatment with tromexan was administered in 17 obstetrical and 5 gynecological patients. Among the 17 obstetrical patients the indications for the treatment were: a previous history of thrombosis in 5 cases, a suspicion of thrombosis in 6 cases, a history of thrombotic manifestations in the same pregnancy in 3 cases, a previous cesarean section in 2 cases, and an unexplained rise of temperature in 1 case. In none of these patients, when treatment was adequate, did there appear evidence of either thrombosis or embolism. In one instance, in which the treatment had not yet had time to exert any effect, there developed a recurrence of a previous thrombotic process. Among the 5 gynecological patients the prophylactic regimen was thought advisable on the basis of a previous attack of thrombosis in 3 patients, and on the basis of a questionable presence of thrombosis in 2 patients. In none of these patients was there any complication.

From his experiences and from a review of the literature, the author mentions the following 6 conditions in which, in his opinion, prophylactic treatment is indicated: (1) a history of previous thrombosis; (2) in the presence of, or where there is the least suspicion of a thrombotic process; (3) in cases in which large blood transfusions have been necessary; (4) in instances of extirpation of the uterus; (5) following severe operative births with possibility of infection; and (6) following cesarean section (7.5 per cent of patients develop thromboses).

Six contraindications to this specific treatment are given: (1) when there is danger of bleeding, as in the presence of gastric ulcer, carcinoma, blood dyscrasias, etc.; (2) when there have been operative procedures on the central nervous system and the slightest hemorrhage can have serious consequences; (3) in the presence of hepatic affections; (4) in the presence of renal disease (heparin should be used if necessary, especially when there is danger of bleeding); (5) during pregnancy (only heparin should be used as dicumarol may produce death of the fetus); and (6) in the presence of infection because of the danger of dissemination of infective material. Antibiotics should be used. —*John W. Brennan, M.D.*

The Late Results of Pelvic Surgery; Some Results Following Hysterectomy and Pelvic Plastic Procedures. EUGENE T. ELLISON and WILLIAM D. THORNTON. *Am. J. Obst.*, 1955, 70: 486.

THE AUTHORS' personal cases over a 5½ year period are reviewed with reference to type of gynecologic procedure performed and follow-up results at least one year later. There were 236 hysterectomies and 100 assorted vaginal plastics in this series. Among the former were 57 vaginal hysterectomies (24%), 13 supravaginal hysterectomies (6%), and 132 abdominal total hysterectomies (70%).

Conservative surgery in which the cervix is retained resulted in the greatest number of complaints one year after operation. The authors state, "removal of the uterus, with or without adnexa, eliminates a site of pelvic pain and removes the functional bleeding with its accompanying anxiety." Their experience with vaginal hysterectomy was that dyspareunia, vaginal stenosis, and mild degrees of recurrence of pelvic ligament relaxation were more frequent following this procedure. —*M. Leon Tancer, M.D.*

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Pathogenesis and Treatment of Vomiting in Pregnancy (Pathogénie et traitement de la maladie gravidique precoce). R. MERGER et J. LÉVY. *Bull. Fed. Soc. gyn. obst.*, 1955, 7: 234.

CLINICALLY the disease is characterized by repeated episodes of vomiting, which are based on a nervous disequilibrium caused by the evolution of the pregnancy, and may lead to a serious condition of denutrition. The frequency and the intensity of this form of disease are of such a wide variety that it is difficult to draw the line between what some authors believe to be a physiologic reaction and others think is a serious pathologic condition. The incidence of cases resulting in serious denutrition is approximately 0.3 per cent. The old formulation of three stages (weight loss, temperature, and nervousness) has been abandoned and replaced by, first, a functional stage during which organic disorders caused by the vomiting becomes more apparent. The vomiting is usually very typical and can easily be differentiated from other types. It is, however, important to investigate the psychologic condition of the patient. The growing pregnancy and the changes in the nervous system are the two outstanding causes reported most often in the literature.

The psychologic element has been known for a long time to neurologists and gastroenterologists. Lantejoul was one of the first to recognize the importance of psychotherapy in the treatment of vomiting during pregnancy, on the assumption that a multitude of mental conflicts had initiated it. However, many problems originating in structures other than the cortex of the brain could not be explained. In many cases different investigators considered the peripheral nerve endings to the female organs as causative agents. The most attractive theory is that of Pavlov, called the Pavlovian nervisme, which holds that the action of the neurovegetative and cerebral and spinal systems is unified. The interoceptor endings receive different impulses (mechanical, pressure, thermique) and send these perceptions through a complex system of ganglions and nerve paths to the cerebral cortex. The cerebral cortex has essentially an inhibitive action on the subcortical centra. A pathologic condition will, consequently, result either from an abnormal stimulation of the subcortical centra or from a cortical inhibition.

The Russian literature contains reports of many experiments related to this genitocortical interaction. They have tried to prove that cervical traction, irrigation of the uterine cavity, and other types of mechanical stimulation to the uterus may result in a definite cortical reaction. It is also obvious that a pregnant uterus can modify this genitocortical interaction. This is apparent from the complexity of clinical changes occurring during the pregnancy and also from the electroencephalographic readings taken during this period.

While the changes and manifestations are due in a large measure to the mental status of the patient, we may assume that the presence of an impregnated ovum plays a certain role in this disease. A chemical more than a mechanical action seems to be the main cause of these manifestations. Many products have been named: hormones of ovarian or placental origin were the first ones to be investigated. Brindau and Hinglais have found that the vomiting is usually accompanied by a high titer of gonadotrophins. Toxic products from the breakdown of different proteins were for many years on the top of the list. The proteins might be of fetal, paternal, or placental origin. With the help of electrophoresis, Veit investigated this theory and found that usually there is an increase of globulins present.

Another theory suggested was that of possible allergic reactions to some placental and spermatic products. Chemical substances such as histamine and acetylcholine, which are important in the neurovegetative system, also came under investigation. Effkeman found increased histamine levels in pernicious vomiting of pregnancy. The participation of the neurogenic system in many conditions (asthma, eczema, etc.) is a well known fact. Many serious cases of vomiting have been attributed to a rise in acetylcholine or a deficit of cholinesterase. It is interesting here to note the role played by some neutralizing products, viz., cholinesterase and histaminase. Absence of these products has been noted in many cases of serious vomiting. Other endocrine substances produced by the anterior lobe of the hypophysis and the suprarenal glands came under investigation. Staemmler found a deficit of corticoids up to 50 per cent in the urine of 29 patients. Chronic diseases such as appendicitis and diseases of the gallbladder and stomach should be ruled out before a definite diagnosis can be made. The changes in blood chemistry and body fluids are not specific to the disease, but are a natural consequence of the denutrition stage.

The development of an impregnated ovum in the female organism can create a serious functional disequilibrium. First of all the nervous system is disorganized, and secondly some toxicity of undetermined nature plays a certain role.

The treatment of the disease, not always easy, has to be directed by the disease itself and by its consequences. Very often a careful psychological approach to the patient may result in a complete cure. Isolation and confidence of the patient are the first steps to be taken once an organic disease has been excluded. A persuasive attitude taken by the physician will soon bring the patient back to a normal emotional status. The patient has to be reassured that she will be cured and that the multiple medications available are only adjuvant to the cure.

Methods of treatment used, but not recommended by the authors, are therapeutic abortion, hypnosis, and psychoanalysis. The therapeutic armamentarium is large; such substances as belladonna, chloral, and barbiturates have been used with some success. Therapeutic induced sleep sometimes has its place just as

have the antihistamines and vitamin B-6. In the hormonal field, diethylstilbestrol and corticosuprarenal products have been given with poor results. Chlorpromazine with or without barbiturates has given the best results as of today. If organic disease is the cause of the vomiting, that must be treated first of all. The cure of ptyalism has been very difficult. The authors have obtained good results, however, with the following type of treatment: daily intravenous injections of 10 per cent caffeine-bromate for 10 days, and for the next 10 days every other day, and the following 10 days only by mouth. The denutrition stage is treated with infusions, proteins, vitamins, and sometimes insulin. During the last 10 years the authors have not done one therapeutic abortion and since 1921 they have not lost one patient.

—*Robert O. Verheecke, M.D.*

The Conservative Management of Pre-Eclampsia and Eclampsia (Die konservative Behandlung der Praeklampsie und Eklampsie). H. WIMHÖFER and P. PFAU. *Geburtsh. u. Frauenh.*, 1955, 15: 769.

BASED ON EXPERIENCES with maternal mortality as outlined in the accompanying table, the conservative treatment of eclampsia is preferable to the operative approach. The material stems from two institutions: the University of Heidelberg (1935–1955) and the University of Leipzig (1937–1953).

	Operative Delivery			*Conservative Therapy*		
	Number	*Maternal deaths*	*%*	*Number*	*Maternal deaths*	*%*
Heidelberg	60	9	15.0	155	4	2.6
Leipzig...	129	23	17.8	256	22	8.6
Total.....	189	32	16.9	411	26	6.3

Serpasil, a hypotensive alkaloid of rauwolfia, has given favorable results in both pre-eclampsia and eclampsia. When pre-eclampsia proves resistant to medical therapy termination of the pregnancy is indicated.

—*Warren R. Lang, M.D.*

A Case of Severe Eclampsia in a Postpartum Female Treated with Artificial Hibernation (Un caso de eclampsia grave del post-parto tratada con hibernacion artificial). RÁUL PISANO VALDES, VICENTE MONTAUBAN NOVOA, and OSCAR MORALES VARELA. *Bol. Soc. chilena obst. gyn.*, 1955, 20: 65.

THE AUTHORS review, in considerable detail, the literature on artificial hibernation and quote the opinions of other authors who have used this technique in the treatment of eclampsia. In addition, they report in detail one case of their own, that of a girl 15 years of age who developed mild hypertension and generalized edema 3 days before the spontaneous onset of labor at term. She delivered a normal infant without difficulty and appeared to be well until an hour and a half after delivery, when she went into her first convulsive seizure and remained in profound coma. She was treated in the usual way, but 11 hours later, because of failure to respond and the persistence of convulsions and coma, cyanosis, and elevated arterial pressure, it was elected to proceed with artificial hibernation. It was necessary to increase the dosage of drugs to the maximum before refrigeration was tolerated, but after 3 days of treatment she recovered from coma. Treatment was discontinued after 5 days, at which time it was noted that she had developed lobar pneumonia. Recovery apparently was complete and the immediate response to early therapy so dramatic as to seem miraculous to her physician.

In summary, the authors raise the question as to whether refrigeration is necessary in these cases, since it was their feeling that the drugs they administered had been chiefly responsible for her recovery. They suggest also that in the more severe cases of eclampsia, therapy should immediately follow these lines rather than a more orthodox pattern to see if it will be sufficient.

—*Howard Ulfelder, M.D.*

NEWBORN

A Vascular Anomaly of the Umbilical Cord; the Absence of One Umbilical Artery in the Umbilical Cords of Normal and Abnormal Fetuses. KURT BENIRSCHKE and WILLIAM H. BROWN. *Obst. Gyn.*, 1955, 6: 399.

AS A RESULT of observation of the occasional lack of one umbilical artery in anencephalic infants, the records on placentas at the Boston Lying-In Hospital and the Free Hospital for Women were reviewed. In the 20-year period covered by this survey there were 55 cases in which the umbilical cord contained one artery and one vein only, or in which only one umbilical artery was present intra-abdominally at autopsy.

Thirteen of the babies were apparently normal. The other 27 had congenital anomalies of various types, as follows:

Site or system	*Description*	*Number*
Neurological	Anencephaly, meningocele, hydrocephalus, etc.	9
Cardiac	Septal defect, transposition, valvular, etc.	8
Genitourinary	Renal, external genitalia, etc.	12
Gastrointestinal	Imperforate anus, esophageal stenosis	13
Extremities	Clubfeet; fusion of digits; extra digits	7
.....	Cleft palate; harelip	3
Others	Skeletal; liver, etc.	7

Seven were classified as pathologic ova and the remainder were stillborn or aborted apparently normal fetuses. There were five sets of twins in the series of 55 cases, one of the twins having a normal and the other an abnormal vascular supply.

The authors believe that the high incidence of congenital anomalies among babies having only one umbilical artery may be coincidental. On the other hand it is possible that a lack of one of these arteries tends to fetal maldevelopment by causing resistance to the blood flow and therefore possible oxygen lack.

—*Warren R. Lang, M.D.*

Cranial Deformities Secondary to Chronic Subdural Hemorrhage in Early Infancy (Le deformazioni craniche secondarie ad ematoma cronico subdurale della prima infanzia). GUIDO LOMBARDI. *Radiol. med.*, Milano, 1955, 41: 849.

FIVE INSTANCES of cranial deformity secondary to chronic subdural hemorrhage in early infancy are reported. These were cases in which a fresh outbreak of symptoms led to roentgenologic study of the skull.

A great deal of attention has been given to this condition in recent times in the English speaking world, but little has been published on the subject in the Italian literature. The purpose of this article is, therefore, to add to the understanding of this condition by the Italian-speaking medical profession.

None of the patients were originally inmates of mental institutions. All exhibited the roentgenologic signs of the condition, that is, asymmetry of the skull: the displacement upward, and frequently medialward, of the lesser wing of the sphenoid and of the floor of the anterior cranial fossa; the forward displacement of the anterior wall of the middle cranial fossa; the external bulging of the temporal bone; and the enlargement in all diameters of the middle fossa.

The first case was that of an 18 year old male without history of trauma in infancy. Four months previously, during a game of Rugby, the patient was struck violently on the head by the ball. Since that time he had been complaining of diffuse headaches which were becoming progressively worse, of vomiting, and of diminution of vision.

Physical examination of the patient revealed bilateral papillary stasis, and nystagmus and paresis of the sixth nerve on the right side. There was some hypoadiadochokinesia of the left upper extremity.

Roentgenography, including stratigraphy, disclosed all the cited signs in more or less outspoken degree. Arteriography of the right carotid artery brought to light the classical medial displacement of the cerebral arteries.

The second case was that of an 8 year old child, again without history of trauma in childhood. Five months previously, the patient began to complain of headache, vomiting, diplopia, and diminution of vision (vision on left side was 2/50).

Roentgenography showed much the same picture as the preceding case; the left half of the skull was enlarged, the middle cranial fossa on this side was enlarged in all diameters, and the impressions of the juga cerebralia could not be seen.

The third case was that of a 43 year old male without history of cranial trauma. Three months previously intense frontal headaches developed, alternating with periods of spontaneous remission. Two months previously difficulty in standing developed with weakness of both lower extremities.

The neurologic examination disclosed a larger left pupil, some weakness of the lower branches of the facial nerve, a mild Romberg sign, weakness of the left lower extremity, moderate asynergia of the upper extremities (worse on the left side), and bilateral tremor of both the upper and lower extremities. There was a hypoadiadochokinesia on the left side, a generalized increase in the tendon reflexes, and a bilateral Rossolimo sign.

The roentgenologic picture was much like that of the two previously described cases; they revealed the presence of a voluminous fluid collection in the right middle fossa of the cranium.

The fourth case was that of a 27 year old male without history of cranial injury in childhood. Two years previously the patient had fallen from a vehicle, striking his occiput on the ground, but without losing consciousness. One month later intense frontal pains occurred; later these pains decreased but never left entirely. One week previously the headaches recurred and weakness in the upper and then the lower left extremity developed rapidly. There was a definite poverty in ideation and a euphoric tendency in the patient's emotional status. The Babinski sign was present and the tendon reflexes were increased. There was a tendency to fall backward in the Romberg test. The eyes showed initial papillary stasis, more evident on the left side. There was a left homonomous hemianopsia.

The roentgenologic and arteriographic findings were consistent with the presence of a rather large, expansive frontal lesion, the nature of which could be determined only at operation. Ventriculography was performed by inserting a needle from the right temporal region. With the needle 200 c.c. of a dense coffee-colored liquid were withdrawn before the air was injected. The roentgenogram was typical for this condition.

The fifth case was that of a 65 year old male without a history of cranial trauma. The week previously he had become aware of a discrete degree of slowly progressive motor deficiency of the extremities on the right side; the arm was the most markedly affected. There was some bradypsychia. There was paresis of the extremities with heightened reflex activity on the right side. The right side of the skull was larger than the left. The roentgenologic and arteriographic findings were much the same as those for the cases previously reported.

At operation on all of these patients a low temporal or frontotemporal skull flap was raised, and the liquid contents of the cystic collection removed; the operative wound was then closed.

The author concludes from his experiences with this material, that the direct roentgenologic signs of hematoma dating from infancy are not pathognomonic of subdural hemorrhage, and that to avoid erroneous diagnoses it is well to include encephalography and arteriography in the examination.

—John W. Brennan, M.D.

The Malformative Effects on the Child of the Viral Infections in the Mother (Les effets malformatifs chez l'enfant des infections virales de la mère). J. FRANÇOIS and G. VERRIEST. *Bull. Soc. Roy. belg. gyn. obst.*, 1955, 25: 182.

SIX CASE HISTORIES are given wherein the author considers that a relationship has been established between a malformation in the child and an infection of the mother by German measles early in the pregnancy.

The first case was that of a 2 year old child with bilateral congenital cataract. The father and mother, aged 36 and 37 years, respectively, were normal, as were 2 sisters and a brother. The mother had suffered an attack of rubella during the first month of pregnancy.

The child was retarded physically and mentally; it would speak only a few words. The cornea of the right eye measured only 9 mm. (microphthalmia). The iris was atrophic and brownish-colored. The pupil was occluded except in its lower portion where there was a retraction of the iris and eversion of the

pigmented layer. During the period in the hospital there was a suffusion of blood (hyphemia). The left eye, like the right, exhibited a homogeneous, total cataract and microphthalmia, the cornea measuring 9 mm. The child exhibited the digito-ocular phenomenon of Franceschetti to a marked degree; that is, it was always luxating its ocular globes forward with the aid of its fingers. Following total extracapsular extraction of the cataract with total iridectomy, the left eye ground showed optic atrophy of primitive character. The retina itself appeared normal; however no macular reflection could be seen.

The second case was that of a 3 year old child who was brought to consultation for strabismus. There was no family history of a hereditary taint. During the third month of pregnancy the mother had suffered an exanthematous attack, lasting a week, which was diagnosed as German measles. Following the attack the mother's urine showed some albumin. The delivery was a difficult one.

The anterior segment of the child's right eye was entirely normal; however, the eye grounds exhibited small masses of pigment (central pigmented pseudoretinopathy). The left eye presented a total homogeneous cataract and an internal strabismus. The cataract was operated upon by discission. The lens absorbed perfectly. The eye ground then could be seen to have the same alteration as that on the right side. The functional result of the operation was nil.

The third case was that of an 8 year old child suffering from deficient vision. There was no family history of hereditary taint. During the second month of pregnancy the mother had suffered an exanthematous attack, lasting 5 or 6 days, which was diagnosed as rubella. The child exhibited attacks of petit mal epilepsy. Both eyes presented a central cataract which was completely opaque. After correction of the myopia and astigmatism the vision in each eye was 7–10.

The fourth case was that of a 1 year old child with an evident malformation in the right eye. There was no family history of hereditary taint. The mother had suffered an attack of rubella at the beginning of the pregnancy.

The right eye was microphthalmic and exhibited a complete central cataract. The cortical layers were entirely normal. The eye ground could not be seen. The right eye presented a normal condition anteriorly; however, the eye grounds exhibited a diffuse retinopathy which was characterized by small masses of black pigment, more numerous in the macular region and in the lower region of the retina. There was also an evident epithelial aplasia, the vessels being particularly prominent about the papilla.

The fifth case was that of a 7 year old child from an institution for the blind. There was no history of either hereditary taint or of illness in the mother. The blood pressure was strikingly low and the pulse was 105 per minute. There was a thrill in the second left intercostal space and a systolic murmur at this place. The electrocardiograph presented a deviation to the right and there was a block of Wilson. Cardiac catheterism confirmed the absence of an interauricular septum.

The right eye was microphthalmic, the corneal diameter being 8 mm. There was present a subtotal congenital cataract which prevented viewing of the eye ground. The left eye also presented a central cataract of the pulverulent variety, a posterior polar cataract, and opacities on the anterior surface of the superior portion of the lens. The eye ground (difficult to see) presented a diffuse punctate retinopathy, and vision was 1/50. There was a concomitant internal strabismus of the right eye and a bilateral horizontal nystagmus.

The sixth case was that of an 11 year old child without history of hereditary taint, who presented dyspnea, cyanosis, and cardiac palpitation at birth. It did not walk until it was 2 years of age. There was a dorsal kyphosis and a retraction of the sternocleidomastoid muscles. The child was also suffering from flat feet and a mild degree of hypospadias. The blood pressure was low and the pulse was 120 per minute. There was a thrill over the entire precordial region with maximum intensity over the pulmonary valve accompanied by a murmur. There was a holosystolic murmur over the apex. The roentgen examination disclosed a globular heart with enlargement of the right ventricle and absence of a "pulmonary window." The electrocardiogram exhibited a deviation to the right.

The left eye presented a heterochromia and an inferior coloboma. There was also a partial coloboma of the lens and a coloboma of the ciliary body and choroid which extended to within one papillary diameter of the papilla. The gonioscopic examination of this eye disclosed the persistence of a little of the iris at the base of the coloboma. This iridal tissue appeared to be ruffled and showed deep crypts; it continued on along the axis of the coloboma by means of a lax, filamentous mesodermic tissue which extended as far as the ring of Schwalbe. The vision was $\frac{2}{3}$ in the right eye and $\frac{1}{6}$ in the left.

As treatment the authors suggest prophylactic exposure of the mother before the onset of the pregnancy, or injections of convalescent serum before pregnancy, during the period of incubation.

—*John W. Brennan, M.D.*

Diaphragmatic Hernia in the Newborn; Diagnostic Responsibility of the Obstetrician. V. M. Bowers, Jr., Thomas W. McElin, and John M. Dorsey. *Obst. Gyn.*, 1955, 6: 262.

Obstetricians are the pediatricians for the newborn in the first minutes of life. We must concern ourselves with all problems, however rare, that may result in immediate neonatal death.

During a 10-year period at the Evanston Hospital, Evanston, Illinois (1944-1954), there were 15,556 deliveries. Although diaphragmatic hernia in the newborn has occurred in only 13 cases, only one infant survived. The diagnosis was established in 4 infants who were submitted to surgery. The other diagnoses were made at postmortem examination.

This problem of diaphragmatic hernia in the newborn was discussed at a clinicopathological conference with the hope of alerting the staff to the possibility of this rare condition.

Two weeks later a term newborn infant developed generalized cyanosis one hour after birth. The cyanosis was more marked when the infant cried.

Examination revealed dullness in the left chest, mediastinal shift to the right, absent breath sounds on the left, and bowel sounds in the left thorax. Roentgenologic examination showed gas-filled loops in the left thorax.

Surgery was performed 11 hours after birth. Through an upper left paramedian incision an elliptical defect in the posterolateral portion of the left diaphragm was exposed. The entire small bowel was found to have passed into the thorax. The bowel was restored to the abdomen and the defect repaired. Anesthesia was well tolerated.

The normal newborn routine was resumed on the third day following surgery. The child was dismissed on the eleventh day after an uneventful recovery. A recent chest film was negative.

This one case demonstrates the value of alert thinking and team work in therapy.

—*John R. Wolff, M.D.*

MISCELLANEOUS

Discussion on the Use of Kielland's Forceps. E. Parry-Jones, Alistair Gunn, Leslie Williams, Chassar Moir, and Others. *Proc. R. Soc. M.*, Lond., 1955, 48: 681.

The place of Kielland's forceps is primarily in the conduct of midforceps deliveries. Their advantages are that they permit an accurate cephalic application, irrespective of the position or station of the head; they provide a gentle and relatively simple method of rotation, without displacement or deflexion of the head. They enable traction to be exerted in the pelvic axis at all levels of the pelvis. Furthermore, only one application is necessary to complete delivery; excessive force is difficult to apply and intravaginal manipulation is reduced to a minimum.—*Alan Rubin, M.D.*

Birth Processes and Carcinoma of the Uterine Cervix (Gestationsvorgaenge und Carcinoma colli uteri). H. Runge and H. Zeitz. *Geburtsh. & Frauenh.* 1955, 15: 877.

It has been well accepted that cervical cancer is uncommon in nuns, Jewesses, and in the woman whose cervix has been cauterized. It seems fairly certain, too, that first coitus occurs earlier in life in those who develop cervical carcinoma than in other women.

On the basis of the authors' study of 1,600 women with cervical cancer as compared with 2,200 healthy women, the average age of the menarche was approximately the same.

In a study of 3,430 cases of carcinoma of the female genital tract seen at the Women's Clinic of the University of Heidelberg from 1935 to 1954, the following proportions of nulliparas were found in the various types of the disease:

	Per Cent
Ovary	30.4
Corpus	20.5
Vagina	18.6
Vulva	18.4
Average	22
Cervix	7

A comparison of 3,050 women with cervical cancer (1914 to 1951) with more than one million normal women showed that the proportion of multipara was more than five times greater in the former group. In a study of 1,800 cases, carcinoma of the cervix appeared earlier in the women with multiple births than in the controls. There seemed to be no correlation, however, with the age of the women at the first birth and the subsequent development of carcinoma.

—*Warren R. Lang, M.D.*

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Ureteral Regeneration: Contracture Versus Hyperplasia of Smooth Muscle. RUDOLF OPPENHEIMER and FRANK HINMAN, JR. *J. Urol.*, Balt., 1955, 74: 476.

THE AUTHORS have set up an experimental situation in which they have described repair and replacement of smooth muscle in the dog ureter after excision of one longitudinal half.

They show that if one-half of a longitudinal section of ureter is resected and the defect be splinted with a polyethylene catheter, the catheter will become surrounded with mucosa and smooth muscle. They propose two explanations for this phenomena: (1) that the defect is bridged by scar tissue which finally contracts, approximating the cut ends of the circular smooth muscle; these ends, prior to section, having been at opposite sides of the ureter, and (2) that the smooth muscle of the cut edges actually is regenerated and new smooth muscle is formed, bridging the semicircumferential gap.

The experimental situation consists of resection of two 5 to 8 cm. segments of one-half of a ureter. One segment is used as a control and the other as experimental. A polythene tube is inserted into the ureter as a splint. A piece of tantalum mesh is incorporated into this tube for a distance of a 5 to 8 cm. segment. The wires of the tantalum extend across the tube and project on either side as the wings of an airplane. These wires serve to keep the two cut edges separated and prevent closure of the gap by postulate (1) above. Microscopic examination of the segment in which the wires were used as a barricade showed that fibrous tissue was laid down and initially filled the defect. There was a subsequent invasion of this fibrous tissue by smooth muscle, which in some animals completely formed a new muscular layer. In others, invasion was only partial. In all cases, however, it appeared that regeneration of smooth muscle had occurred and this was a property of ureteral smooth muscle as well as that of heart, ureters, and bladder. In the control segments, all areas were completely filled with regenerated smooth muscle, and it was presumed by the authors that the presence of the wire mesh delayed or inhibited to some extent the regeneration which might otherwise have occurred.

—C. Barber Mueller, M.D.

Congenital Renal Polycystic Disease; a Clinical and Therapeutic Study of 366 Cases. HOWARD B. SIMON and GERSHOM J. THOMPSON. *J. Am. M. Ass.*, 1955, 159: 657.

MUCH PROGNOSTIC PESSIMISM has been associated with polycystic disease of the kidney. When the variability of the clinical manifestations and course of this not uncommon clinical entity is considered, the pessimistic prognosis is oftentimes unwarranted and unjust to the patient. The present study was undertaken to elaborate further on the various aspects and manifestations of the disease that, when properly evaluated, permit the physician to outline treatment more accurately and prognosticate in a given case.

The 366 cases of polycystic disease of the kidneys encountered at the Mayo Clinic in 20 years (1925 through 1944) were reviewed and follow-up data were obtained. The pathogenesis of renal polycystic disease is not entirely understood. It has congenital and familial aspects. Lumbar or upper abdominal pain, renal infection, hematuria, and gastrointestinal symptoms are the commonest symptoms of this disease. Hematuria and gastrointestinal symptoms indicate a poor prognosis, the latter being particularly ominous in this respect. In the majority of cases one or both kidneys will be palpably enlarged and moderate or severe hypertension will usually be present. Severe hypertension indicates an advanced stage of the disease.

The most reliable and consistent prognostic sign in the authors' series was the presence or absence of renal insufficiency. Renal impairment, with or without anemia, indicated that the prognosis was particularly poor.

Operation usually is indicated only when complications require it. Occasionally, however, when only one kidney is primarily involved and is apparently functionless, its removal may add to the survival and comfort of the patient provided that the contralateral kidney is not impaired. Cyst puncture may occasionally be employed incidental to other surgical procedures, but aside from the rare instances in which it is necessitated for the relief of symptoms resulting mechanically from the size of the cysts, the authors could demonstrate no valid primary indication warranting this procedure. The hope that this operation might prolong life in the presence of early renal insufficiency was not supported in this study.

The authors particularly emphasize the fact that it is not too unusual for a patient with renal polycystic disease to live an essentially normal life span. It is said that the prognostic factors discussed in this paper may permit the physician to so encourage his patient. The authors express the hope that undue pessimism concerning this disease will be less prevalent in the future.

BLADDER, URETHRA, AND PENIS

Tumors of the Urinary Bladder: a Clinicopathologic Analysis of Over 2,500 Specimens and Biopsies. MEYER M. MELICOW. *J. Urol.*, Balt., 1955, 74: 498.

A REVIEW of the findings in 2,502 specimens of vesical lesions is presented. Ninety-five per cent of the primary tumors developed from the urothelium and 5 per cent from the stroma. Of the urothelial tumors, 81.1 per cent were papillary, 7 per cent were nonpapillary, 11.4 per cent were metaplastic (mainly squamous cell tumors), and 0.5 per cent were glandular.

The majority of the nonpapillary (solid) and metaplastic tumors were of the infiltrating variety. The adenocarcinomas were rare, and probably arose from

a urachal remnant or subtrigonal glands, or metaplastic cystitis glandularis.

There was only one urothelial tumor, in a child 7 years of age. The youngest adult was 22 years of age, the oldest was 90. Males outnumbered females four to one.

Nine out of 65 excised diverticula contained a neoplasm, an operative incidence of 13.8 per cent. The presence of an enlarged prostate sometimes obscured an accompanying vesical neoplasm. Prostatectomy in such cases seemed to accelerate spread and metastases from the growth within the bladder.

Transurethral fulguration or resection of bladder tumors was limited to those neoplasms which were readily accessible and which could be ablated at one sitting. The papillary tumors with narrow pedicles responded well to this modality. Neoplasms which had penetrated the base were treated more adequately with the resectoscope, but it was often difficult to gauge the depth to which the tumor had reached.

The great frequency of multiple recurrences following transurethral fulguration suggested the possibility of seeding resulting from manipulations by the instrument and/or the continued action of a carcinogenic agent acting on vulnerable urothelium, or the coming to age of invisible tumors.

Suprapubic segmental resection or hemisection of the bladder was used in the management of large, broad, sessile growths resulting from mobile portions of the bladder. Unrecognized regional lymph node involvement vitiated such removal. Moreover, recurrences were not uncommon, and there was a great incidence of scar involvement by tumor due to probable seeding at the time of operation.

Large penetrating tumors, particularly in fixed regions of the bladder, were often treated effectively with radium needles inserted via the suprapubic route. Postoperative morbidity from inflammation, infection, ulceration, and calcareous débris was a serious complication. Considerable functional disturbance followed this form of therapy.

Cystectomy and ureteral transplantation were carried out in patients with extensive surface involvement, in those with lesions located on the trigone and/or bladder neck, and as a last resort on patients who, in spite of numerous previous treatments (fulgurations, radium, or segmental resection) continued to return with more and more tumors.

Theoretically, complete removal of the entire cancer-bearing area and of all vulnerable urothelium should have been the ideal procedure in a disease which has a great tendency to "recur." Unfortunately, the results were frequently unsatisfactory. Electrolyte disturbances, acidosis, and above all ureteral obstruction, hydroureter, hydronephrosis, and pyelonephritis were some of the serious complications. Life with comfort was prolonged only in a few.

If it were possible to tell in advance which case would return again and again with recurrences following other forms of therapy, then cystectomy performed before infection, mural extension, renal damage, and constitutional deterioration develop might save much pain and trouble to both patient and doctor. Unfortunately, there is no way at present of determining this in advance.

Extensive mutilating operations (total cystectomy, exenteration, etc.) in patients with deepseated invasive tumors only increased debility, destroyed personality, and did not significantly lengthen the postoperative life span. —*C. Barber Mueller, M.D.*

Substitution of the Urinary Bladder by Means of the Sigmoid Colon Without Disturbance of the Urinary or Fecal Retention Time (Ersatz der Harnblase durch das Sigmoid ohne Stoerung der normalen Harn- und Stuhlkontinenz). JIRI HRDLICKA. *Zschr. Urol.*, 1955, 48: 547.

SIX DOGS were used as experimental animals (3 males and 3 females) for the substitution of the urinary bladder by means of the sigmoid colon. The operation consisted essentially of isolation of a 7 cm. portion of the sigmoid and re-establishment of the intestinal continuity. The upper end of the isolated portion was closed and the ureters were anastomosed to this portion by the Leadbetter method. The urinary bladder was then excised and the residual stump of the urethra was anastomosed to the lower end of the isolated portion of the sigmoid (the new, artificial bladder).

All of the dogs recovered except 1 which died of peritonitis due to leakage from one of the sutures of the intestinal anastomosis; that is, it had nothing to do with the urinary tract. In another dog the isolated portion of the sigmoid was deliberately left too long (more than 20 cm.). After the operation this animal did not do well, was reoperated upon, and the artificial bladder was shortened. After this the animal recovered rather promptly.

On the whole, the results obtained by the author are considered more favorable than those reported by other workers (Rieger and Harris. *Surg., Gyn. Obst.*, 1953, 96: 1, and the other workers cited) and have led him to propose justifiable indications for the procedure. The author believes that the procedure is indicated in the cystectomies for nonmalignant processes, in congenital malformations, and in instances of tuberculosis or cancer of the urinary bladder in which there is hope of a long period of survival. Likewise, in many of the more extensive evisceration operations the formation of an artificial bladder may markedly ameliorate the postoperative condition of the patient, when otherwise the urine would be emptied through a colostomy opening.

Although the work has been done on animals and the period of observation has been rather short (up to 8 months), with these restrictions in mind the author sees no obstacle to applying the method to the human subject. For the operation on the human being a three phase procedure is suggested, since the technique is a much more difficult one. In the first phase the ureters might be implanted in the blindly closed sigmoid sac and an artificial anus constructed; in the second phase the cystectomy could be carried out and the artificial bladder completed; and in the third phase the colostomy might be removed and the continuity of the intestine re-established. With this method of procedure the mortality should probably not be greater than in the author's series of experimental animals, or that following extensive radical operations for malignant ulcers in other parts of the body.

—*John W. Brennan, M.D.*

GENITAL ORGANS

A Comparative Analysis of 1,000 Consecutive Cases of Transurethral Prostatic Resection. R. Theodore Bergman, Roderick Turner, Roger W. Barnes, and Henry L. Hadley. *J. Urol.*, Balt., 1955, 74: 533.

The authors present a comparative analysis of 1,000 consecutive transurethral prostatic resections which were divided into two series a decade apart, 520 resections being performed from 1940 to 1944 and 480 from 1950 to 1954. In both series the same operators, the same technique, and the same type of instruments were the constant factors. There were notable differences in management. In the 1950 series, a nonhemolytic irrigation fluid was used during the resection, almost no irrigation was used postoperatively, and antibiotics were given when the patient had a high temperature. In the 1940 series, water was used during the operation, frequent bladder lavage was practiced postoperatively for 48 hours, and sulfonamides were used to combat infection.

The study considered primarily tangible factors which could be compiled accurately, such as weight of tissue, number of hospital days and hospital deaths. The comparative findings are tabulated.

In the later series less time was consumed in removing the larger glands (grades 3 and 4). In grade 4 of the early series, an average of 82 minutes was required to remove an average of 128 gm. as against 72 minutes for removing 152 gm. in the 1950 to 1954 series.

With regard to the weight of tissue removed, the present data did not include neck contractures or bars. There was little difference here, the average tissue weight being 36 gm. in the 1940 series and 38 gm. in the 1950 series.

Hospital days are noticeably less in the recent series, the 1940 group showing 70 per cent with an extended stay beyond the eighth day as against 42 per cent for the more recent series. This can be attributed to improvement in technique and modern antibiotic therapy.

Without the routine use of wide spectrum drugs, the 1950 series showed improvement, with one out of 4 experiencing no elevation of temperature above 100 degrees F. as compared to one out of 5 in the 1940 group.

Observations and conclusions based on studies of the total number of cases without a comparative analysis of the two series are also offered.

There were 157 cases of carcinoma among the 1,000 cases reviewed. This was in close accord with the preoperative impression obtained by rectal palpation, giving an error of only 3.1 per cent in clinical diagnosis. Selected sections of tissue from the deep dorsal portion of the gland near the verumontanum were important in the histopathologic study, since omission of these sections would have resulted in an error of 11 per cent.

Histopathologically, the most prevalent carcinoma was grade 3.

Perforation of the prostatic capsule occurred in 33 cases. Of these, 3 died, and it is believed that the use of water as an irrigating fluid was an adverse factor.

There was a morbidity of 50 per cent in the fifth decade, but it was less in the sixth, seventh, and eighth decades. There was no increase in morbidity with the removal of 50 to 100 gm. of tissue. There was an increase in morbidity with removal of more than 100 gm. of tissue. The hospital mortality, however, rose directly with the age in decades. The overall mortality was 1.8 per cent.

Among the criteria for a successful transurethral prostatic resection are the following: absence of temperature elevation by fifth postoperative day, the catheter having been removed on the third day if the temperature was below 100 degrees and the urine clearing; a free stream on voiding, with no undue pain; good control before discharge by the eighth postoperative day. The data discussed are presented in tabular form. —*Allan K. Swersie, M.D.*

Bilateral Interstitial Cell Tumor of the Testis; Report of 1 Case Observed for 14 Years. Philipp Rezek and H. C. Hardin, Jr. *J. Urol.*, Balt., 1955, 74: 628.

The authors present a fourth reported case of bilateral interstitial cell tumor of the testis. This case was followed for about 14 years, which afforded the opportunity to observe the clinical and histologic manifestations during this period of time.

The etiology of these tumors is not known. Experimental production has been carried out by a few authors, with the use of excessive amounts of estrogen in certain mice. The fundamental chemical and physiologic mechanism remains to be explained.

The clinical manifestations of this tumor vary. In children, they include precocious puberty, i.e., voice changes, muscular development, mental maturity, erections, and ejaculation. In adults there may be an occasional reversal, i.e., gynecomastia, loss of libido, and aspermia. This may be due to a powerful estrogenic agent which in the first place stimulates proliferation of the interstitial cells. In the case presented, precocious development continued to progress after removal of one testis and upon removal of the second testis there was a return to the normal state.

The patient's growth and development were normal up to the age of 3 years, at which time there was noted abnormal growth of the genitalia, pubic hair, and accentuation of male characteristics. When first seen at the age of 6, following admission for tularemia, the boy had a stature of adolescent and adult genitalia. Three years later, at 9 years of age, the patient presented a painful left scrotal mass, ten times the normal size. The skeletal system showed the development of an 18-year-old male. At operation the specimen weighed 130 gm. and involved the entire testis and globus major and minor. Microscopically the testicular pattern was replaced by irregular shaped cells with smaller and larger nuclei and a fine chromatin network. Cellular arrangements resembled those seen in the liver or adrenals. No testicular tubules were present.

Postoperatively the patient had no regression of his precocity and at the age of 17, upon admission to the hospital for an eye infection, he submitted to biopsy of the right testis which now was three times the

normal size, hard, and nodular; 17-ketosteroid excretion was 81 mgm. in 24 hours. The microscopic picture showed closely packed ovoid or polyhedral cells with granular cytoplasm and 1 or 2 eccentrically located nuclei. No mitoses were noted.

One and one-half years later, a right orchiectomy was performed because of pain. The removed organ felt nodular and firm in some areas, soft in others. The microscopic picture resembled generally that previously noted at biopsy. Preoperative 17-ketosteroid determination showed 91 mgm. per 24 hours, alpha 36 mgm., and beta 55 mgm. 17-ketosteroid determinations made 11 and 16 months postoperatively showed a total of 3.9 mgm. (alpha 3.9 mgm. and beta 0 mgm.) and a total of 2.1 mgm. (alpha 2.1 mgm. and beta 0 mgm.). The disappearance of the beta portion may be explained on the basis that the source (the testes) was removed.

The patient is living a normal life on testosterone, with hair lines, muscles, voice, and prostate normal for his age. —*Allan K. Swersie, M.D.*

MISCELLANEOUS

Ascending Trichomoniasis in the Male (Ascendierende Trichomoniasis beim Mann). HANS JÜRGEN KEUTEL. *Zschr. Urol.*, 1955, 48: 492.

THE OBSERVANCE of 51 men with trichomonas-positive prostatitis in a period of 5 months motivated the author to publish a study of this material. He found that there are bland, subacute, subchronic, and chronic forms of this affection. There are also highly acute cases of trichomonas prostatitis with fever, dysuria, and marked infectious findings on rectal palpation. However, the infections in the male frequently run a symptom-free course and are detected only as a control finding when the sex partner is known to be affected. In the region of Dresden-Johannstadt, Germany, it has been determined that every third woman harbors the trichomonas.

As a rule, the male partners of these women did not complain; nevertheless, there were nearly always rectal findings with evidence suggesting a nonspecific prostatitis. Symptoms of mild character could usually be elicited upon careful questioning; such as morning drop, itching of the glands, dysuria, and burning sensations in the urethra, especially upon defecation, with evident after-pressure sensations and sacral pains. Most of the patients were sexually mature. The most reliable material for diagnosis was procured from ejaculated semen.

In the prostatic secretions chiefly the cystic or amoeboid forms of the organism were observed; smaller forms with flagellae, resembling a fish form, and pear-shaped forms were also observed.

In this material artificial fever (pyrifer) therapy frequently led to the changing of these forms over into the cystic form exclusively, or to the flagellated form or the fish form, which types were regarded as particularly tenacious of vitality. The author believes that the high alkalinity of the prostatic fluids may have something to do with the production of the more resistant forms.

The frequently mentioned possibility of retrograde involvement by the trichomonas of the seminal vesical, the vas deferens, and, indeed, of the testicular tissues has now been demonstrated by the author. A 57 year old patient underwent a bilateral excision of the epididymis. Previous to the operation prostatic massage had uncovered the presence of the infusoria. Histological findings which were identical for both sides showed the presence of an odd form of oligopurulent prostatitis. The epithelial elements were not markedly involved; the interstitial elements were markedly infiltrated by granulation tissue with edematous changes and cellular infiltrations, composed chiefly of histocytic and lymphocytic cells (few pus cells). The vas deferens was also involved in these changes.

The fresh tissue of these specimens was examined under the phase-contrast microscope. With this method the flagellated parasites could be seen in the dilated canaliculi of the epididymis and the method permitted of detecting certain signs of vitality in the organisms; in fact, in this instance one of the organisms was detected in the process of division.

In another patient (47 years old) the trichomonas was demonstrated in the testicle itself. Involvement of the epididymis with abscess in the testicular tissue required a semiablation (antibiotics had no effect on the process). In several unstained smear preparations of the purulent material from the abscesses the round form of the trichomonas was encountered, that is, an encysted form in which the phase-contrast microscope was able to portray in vital preparations movements of the endoplasm and ectoplasm with evident nuclear borders and sharply cut cellular borders. The author agrees with Holz that these encysted forms are resistant persisting forms of the organism. The changes in form explain the many little understood recurrent infestations of the trichomonas in the male adnexa.

At present the author seems reluctant to suggest a form of treatment which reliably promises a cure; he himself has been using an arsenical (neoarsoluin) without marked success. He has also been attempting to get results with erythromycin. Following treatment with atabrine and with resotren there was evident subjective and objective improvement in the condition of his patients; nevertheless, the spermatogram (semen-smear) still showed the persistence of the encysted forms in 70 per cent of cases. It is true that these encysted forms following treatment as described showed vacuolar changes; however, the author does not answer the question as to whether vacuole formation represents a degenerative change in the organism.

—*John W. Brennan, M.D.*

Spinal Osteomyelitis Associated with Urinary Tract Infections. TED F. LEIGH, ROBERT P. KELLY, and H. STEPHEN WEENS. *Radiology*, 1955, 65: 334.

THE AUTHORS present clinical data concerning 9 patients in whom osteomyelitis of the spinal column developed subsequent to infections and instrumentation of the urinary tract. They point out that bacteremia is not uncommon in genitourinary infections and postulate that the organisms gain access to the spinal column through the broad communications which exist between the venous plexus of the pelvic organs and the venous plexus enclosing the spinal cord and surrounding the spinal column.

Organisms were obtained by aspiration of the lesion in the spinal column in 4 of the 9 cases; cultural studies disclosed Pseudomonas, Proteus vulgaris, Escherichia coli, and Staphylococcus aureus. An exact identification of the causative organism is a prerequisite to proper therapy. A suggested technique for recovering the organism is as follows: the patient is placed prone on the radiographic table and is anesthetized. An area on the back near the spinal lesion is cleansed and draped. The skin is punctured with a Biers 15-gauge, 3.5-inch stainless steel spinal needle. This needle is directed anteriorly and obliquely inward toward the lesion in the vertebral body and disc. Without change in the patient's position, 8 by 10 inch roentgenograms are made in posteroanterior and lateral projections. These are immediately processed and studied. Further adjustments of the needle and additional roentgenograms are made as necessary. Aspiration is done and the aspirated material is cultured and studied microscopically.

Roentgenologic evidence of a lesion in the spinal column lags behind the clinical manifestations and additional studies may be necessary every few weeks until the lesion is detected. Multiple levels of the spinal column are commonly involved and adequate studies of the entire column should be undertaken when osteomyelitis is discovered at one level. Tomography may be an important adjunct.

The prognosis of osteomyelitis of this type is favorable, in general, inasmuch as the healing tendency is pronounced and extensive destructive changes are rare. —*Laurence F. Greene, M.D.*

Reversed Seromuscular Grafts in Urinary Tract Reconstruction. WILLIAM C. SHOEMAKER. *J. Urol.*, Balt., 1955, 74: 453.

IN THE present experimental study the author compares (1) the use of five types of intestinal grafts for replacement of the bladder, (2) the ion absorptive phenomena associated with these types of graft, (3) the experimental use and function of seromuscular grafts in replacement of the entire bladder, and (4) the use of seromuscular grafts to replace a segment of ureter.

In the first part of this article the technique of forming a seromuscular graft with a piece of ileum is described. The segment is removed with its pedicle flap of mesentery, the mucosa is removed, and a pouch with the serosal surface toward the lumen is formed and anastomosed to the bladder trigone. Similar grafts were made of colon segments. Ileal segments with intact mucosa toward the lumen were used also. Ileal segments with the mucosa removed, leaving the raw submucosa facing the lumen, were used; and ileal grafts with mucosa and submucosa removed, leaving the muscularis facing the lumen, were likewise used. Biopsies were taken at intervals.

Observations on the reversed seromuscular graft, up to 12 months postoperatively, showed no frequency, incontinence, loss of leg-raising reflex, or residual urine. Bladder capacities were about 125 cubic centimeters, the blood electrolytes remained normal, and excretory urograms were normal. There was no functional disability in this series. The serosal surface was replaced with transitional cell epithelium which started to migrate from the trigone in 7 days, and in 3 weeks this was indistinguishable from bladder epithelium. After 3 weeks the muscle bundles rearranged themselves in such a fashion as to resemble normal bladder muscle after a period of 6 months.

Similar results were obtained from reversed seromuscular grafts of the colon. Ileal grafts with intact mucosa revealed a constant bacterial cystitis and a gradual small elevation of nonprotein nitrogen over the subsequent 6 to 8 months. The muscle layers retained their identity as intestinal muscle layers. After stripping either mucosa or submucosa, regeneration of intestinal type mucosa occurred.

Absorption studies utilizing radiosodium, radioiodine, and radiophosphate were carried out with normal bladder as a control, and the rates of appearance of the test materials into the blood stream were noted. The reversed seromuscular graft bladder reabsorbed as a normal bladder, while those with untouched ileal segments gradually had an increasing plasma nonprotein nitrogen concentration and slight depression of the chloride.

A reversed seromuscular graft was used after total cystectomy in 6 dogs; no frequency, incontinence, or retention was observed, and urograms showed the upper tract to be normal. A long tubelike segment was constructed in 4 dogs and used to replace a ureter with equally good results.

—*C. Barber Mueller, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Vascular Pattern as an Aid to the Diagnosis of Bone Tumors. A. C. Begg. *J. Bone Surg.*, 1955, 37-B: 371.

In a survey of 517 cases of bone tumors from the Bristol Bone Tumor Register, Walker found that in 55 the diagnosis still remained debatable after careful clinical, roentgenological, and pathological examination. The author believes that a study of the vascular pattern of suspected bone tumors provides both positive and negative information of value for the diagnosis and planning of treatment.

A study of normal arteriograms of the limbs was made. This was the basis for the study of bone tumors. The author believes that the following may be taken as positive evidence of malignant tumors on intra-arterial injection of 35 per cent diodone after distal application of a tourniquet at an appropriate level: (1) visible periosteal vessels, (2) an increase in the caliber of the feeding arteries and draining veins, and (3) a tumor circulation. In cases of hemangioma, the diodone is injected directly into the lesion.

—*Daniel H. Levinthal, M.D.*

FRACTURES AND DISLOCATIONS

The Biomechanics of Fracture Healing. Mikio Yamagishi and Yoshiyuki Yoshimura. *J. Bone Surg.*, 1955, 37-A: 1035.

The healing of fractures depends upon the mode of fixation. The most important biomechanical factors which govern adequate bone healing are muscle action internally and mode of fixation externally. According to Krompecher's postulates which have been corroborated by the authors, of the Yokohama University School of Medicine, cartilage appears at the fracture site when compression to the fracture is applied and ossification ensues by enchondral bone formation. On the other hand, fibrous connective tissue, displaying intramembranous bone formation, appears under tensile force between the fracture fragments. Other factors augmenting bone healing are minerals, hormones, and vitamins.

Using normal healthy rabbits, the authors embarked on an extensive experiment to determine the biomechanics of bone healing, viz.:

1. Firm controlled fixation, which consisted of osteotomy of the rabbit tibia and placing two wires across the shaft above and below the osteotomy. With an ingenious external platelike attachment to the four wires, the authors were able to impact the cut end of the bones or distract them.

2. Loose controlled fixation or allowing the fracture fragments to move along the longitudinal axis during the healing phase.

3. Compressive fixation: heavy rubber bands were installed on wires, which resulted in a constant compressive action on the bony fragments.

4. Extensile fixation: this method consisted of alternating extension and compression of the fractured tibiae. Hence, healing was interrupted every 3 days by moderate distraction first, and followed by impaction until healing took place.

5. Spring fixation: with the aid of a spring installed on plates, the bones were able to yield to the distracting force during the animals' state of rest, but the expansive power of the springs would be vitiated once the animals' muscle tone was regained by movements. Hence, the intervening hematoma and granulation tissue at the fracture site were intermittently compressed.

6. Shearing force applied on the fracture ends.

Of 250 rabbits operated upon, approximately 200 were suitable for evaluation. Postoperatively the animals were sacrificed at intervals of (1) 1, 2, 3, and 4 days, (2) 1, 2, 3, and 6 weeks, and (3) at 2 to 3 months (a few animals), respectively. At necropsy roentgenologic and histologic studies were made. One week after fracture an edematous, loose connective tissue with hematomas and osteoblasts appeared at the fracture site. While no bone formation was observable at this juncture, ossification was evident in the form of an intramembranous bone formation. Two weeks after fracture a bridging callus of bony tissue was discernible in some areas. Edematous connective tissue was rapidly diminishing at this stage with an increment of small foci of cartilage. At 6 weeks after operation, an anchoring callus, (of lamellar bone structures with obvious, almost complete bony reconstruction) was noted. This reparative process is sometimes alluded to as secondary bone. The authors' experimental deduction is, in part, that the first phase in fracture healing is aseptic inflammation around the hematoma. Moreover, in the early phase, the callus formation is essentially the same, irrespective of the variable type of fixation. By and large, the greater the fixation of fractured tibias, in the present studies, the smaller the callus and vice versa.

PSEUDARTHROSIS

Six animals were used to illustrate the experimental production of pseudarthrosis by a transverse fracture of the tibia. The callus in this series was not only larger with predominance of fibrous tissue proliferation but also approached the nonunion level. In another 4 animals, the bones were osteotomized obliquely. By means of an external springlike apparatus, a shearing action was activated during the healing phase. These animals were observed from 2 to 3 months with a resultant nonunion. Histologic studies seemed to indicate an abundance of bony callus, externally and internally in the upper fragments and scanty in the lower end. Between the bone fragments an overwhelming cicatrization with a small amount of hyaline cartilage was seen. The etiology of pseudarthrosis is summarized and may result from: (1) malnutrition, age, inadequate immobilization,

wide separation of the fragments, insufficiency of the blood supply, interposition of soft tissue and infection. By callus differentiation under a biomechanically neutral condition is meant to achieve controlled fixation during the healing of bone; plus minimum of soft tissue injuries, (periosteum included) early fracture healing, absence of muscular contractile action, and sustained hydrostatic equilibrium. While it was possible to control all the above biomechanical neutrality, the authors found it difficult to avoid muscular contractility. Hence, 10 animals were subjected to division of muscle and nerves in addition to the osteotomy and showed a synchronous formation and modification of bony substances. Moreover, it was apparent that bone formation under these ideal conditions occurred by direct transformation of mesenchymal cells into osteoblasts.

CALLUS DIFFERENTIATION UNDER EXTENSION

Immobilization of a fracture with extensile fixation results in a prodigious connective tissue proliferation, which then becomes bony tissue by intramembranous bone formation. When the extension is great it is augmented every 2 to 3 days and the fibrous callus is increased markedly with simultaneous inclusion of fat and other fibrous tissue in the substance of the callus, which in turn delays ossification.

CALLUS DIFFERENTIATION UNDER SHEARING FORCE COMBINED WITH INTERMITTENT COMPRESSION

The fracture callus produced by this method was characterized by a predominance of cartilaginous mass and lesser amount of fibrous tissue. The former becomes bone through normal enchondral ossification, and some undergoes regressive changes, i.e., into myxomatous, soft degeneration. Hence, pseudarthrosis ensues as a degenerative process involving both the bone and callus, which invariably delays ossification and results in a nonunion, both histologically and clinically.

The authors observed 36 cases of transverse fracture in man. Their opinion seems to confirm the view that the biomechanical bone healing process of the experimental animal behaves very similarly to that of the human being. Plaster of paris immobilization is, by and large, their method of choice in achieving optimum conditions for the ideal healing of most of the fractures in man. —*Samuel L. Governale, M.D.*

Orthopedic Aspects of Diabetic Neuropathy. ROBERT H. CRAM. *J. Bone Surg.*, 1955, 37-A: 967.

SINCE DIABETIC NEUROPATHY is found in 5 per cent of all diabetics and is a great imitator of syphilis, the disease poses certain academic diagnostic problems. Weight loss is associated with fat catabolism. Moreover, derangement of fat and carbohydrate metabolism reflects on the advent of diabetic neuropathy. Interestingly enough, proper treatment of diabetes results in the reversibility of peripheral nerve and secondary degeneration of the spinal cord involvement. Neuropathy is prone to progress in patients who fail to co-operate with a diabetic regimen or patients in whom the disease becomes uncontrollable with diet and insulin.

The author describes the diabetic neuropathies in 3 classified groups: (1) the hyperglycemic type which is symbolic of tenderness along the nerve during the acute episode with intermittent subsidence, (2) a circulatory type characterized by peripheral paresthesia, hyporeflexia, hyperesthesia, and intermittent claudication with absent pulses, and (3) the degenerative type with symptoms of interest to orthopedic surgeons (these symptoms are: dull, burning or shocklike pain in the knees, ankles, hips, thighs, legs, shoulders, hyperesthesia, and hoarseness, in order of importance.

The report is based on a series of 27 patients with diabetic neuropathy necessitating hospitalization. Ages varied from 13 to 69, with a mean average of 48.

The fasting blood sugar ranged from 73 to 600 mgm. per 100 c.c. of blood. Sixty-two per cent of this series had developed diabetic retinopathy resulting in blindness from cataracts.

Sensory disturbances are variable. Hyperesthesia and hypoesthesia may coexist in the same dermatome. Loss of sensation, vibration, position, pain, or temperature are also noted.

Muscle power varies between normal to complete paralysis. Dorsiflexion was lost in 5 patients, one of whom disclosed severe foot drop. In some isolated cases, muscular weakness was noted in the hands, arms, knees, and ankles.

Studies of the cerebrospinal fluid revealed a marked elevation of protein (65 to 100 mgm.) in most of the cases.

Four illustrative cases are described in detail. All 4 patients depicted diabetic neuropathy with sensory and motor dysfunction which was promptly reversed on good diabetic therapy. In one case, failure was encountered; the latter condition failed to improve because the diabetic management was uncontrollable. In short, diabetic neuropathy is a lesion involving the sensory and motor tract plus retinopathy. Sympathetic and parasympathetic nerve lesions are least common. In some cases the spinal fluid protein is moderately elevated. The intraspinal pressure and cell count are essentially normal.

—*Samuel L. Governale, M.D.*

Nonspecific Spondylitis with Particular Reference to Chronic Pyogenic Osteomyelitis and Its Differential Diagnosis from Tuberculosis of the Spine (Die Unspezifischen Spondylitiden, insbesondere die chronische Osteomyelitis purulenta und ihre differentialdiagnose gegenueber der Wirbeltuberkulose). WILHELM LANG. *Langenbecks Arch. u. Dęut. Zschr. Chir.*, 1955, 281: 37.

TOO OFTEN a lesion of the spine has been diagnosed as tuberculosis without considering the possibility of a nonspecific type of spondylitis. This occurred most frequently in the treatment of refugees or prisoners of war in whom early roentgen films and the initial histories of diseases were not available. Osteomyelitis of the vertebrae is considered a very rare disease, and comparatively few cases have been reported in the last 40 years. The ratio between tuberculosis of the spine and osteomyelitis of the spine was approximately 500 to 10 in a large series of cases. Among 500 patients with active tuberculosis, involvement of the

spine was found in 60 per cent. In hematogenous osteomyelitis affecting the long bones, the infection was found to be localized in the spine in 2 per cent of the cases. In tuberculosis the spine is affected in 75 per cent of cases. Only one among 1,000 patients with Bang's disease was found to have foci of infection in the spine. The author states that nearly all patients with typhoid fever showed involvement in the vertebrae. The infection remains quiescent and only rarely becomes clinically significant.

An early and correct diagnosis of tuberculosis is very important because chemotherapy should be started as soon as possible. There are three types of destructive infectious diseases of the spine which have to be considered from the clinical point of view: (1) tuberculous spondylitis, (2) pyogenic osteomyelitis of the vertebrae, and (3) so-called infectious spondylitis.

1. Tuberculous spondylitis is a complication of a nonspecific infectious disease, and is usually caused by a "benign" type of organism such as staphylococcus aureus. The disease is characterized by its prolonged chronic course. The occurrence of infection in the spine is usually preceded by one-half to two and one-half years of tuberculous dissemination to the extrapulmonary organs; there is usually a cold abscess and "caseation." The treatment of tuberculous spondylitis is usually successful, provided it is begun at an early stage and carried out continuously. Treatment consists of immobilization, chemotherapy, and the prevention of "mixed infection."

2. Pyogenic osteomyelitis of the spine usually appears as a very acute septic disease with acute pain in the affected portion of the spine. A "hot" abscess usually forms within a few days or weeks. The abscess may penetrate into the thorax or disseminate throughout the body, with the symptomatic picture of tuberculosis. The treatment is surgical. A laminectomy should be performed as soon as practicable, as this may be a life-saving procedure. In the presence of tuberculosis, however, surgery should be postponed, and an expectant course of conservative therapy should be followed. Paralyses in tuberculosis of the spine occur, as a rule, only when the midportion of the thoracic spine is affected. A tuberculous focus cannot be completely eliminated by laminectomy, and the fact that the wound usually heals slowly, and that there is the danger of a mixed infection would also point to a more expectant therapy in tuberculosis. The differential diagnosis becomes more difficult in old recurrent cases of osteomyelitis and tuberculosis with mixed infection. It is important to differentiate these two conditions. In a mixed infection superimposed on tuberculosis, the focus usually remains localized and there is the possibility of a spontaneous "recovery" without the formation of a severe necrosis of the soft tissue and of a sequestrum. In chronic osteomyelitis of the spine, repeated excision of scar tissue and removal of sequestra may prevent amyloidosis and assist the patient in his recovery. Prior to the era of chemotherapy, the average mortality from osteomyelitis of the spine was estimated to be 50 per cent higher than it is today. In examining the roentgenograms of these two conditions, the absence or presence of the intervertebral disc cannot be relied upon to point either to a pyogenic or tuberculous spondylitis. In both of these conditions the intervertebral disc was found to be destroyed in many cases. Tuberculosis, as a rule, affects the body alone but not the appendages of the vertebrae; in osteomyelitis the primary focus may be found in the appendages of the body. The primary focus in tuberculosis is usually found in the cancellous bone of the body underneath the upper or lower plate of the body. Often a second focus develops simultaneously in a similar location in the adjacent vertebral body. This "double image" of the primary focus has been observed in many cases and, as the disease progresses, destruction usually occurs in the same manner in both foci. Osteomyelitis usually confines itself to one body and to destruction of the entire body. Often the body is found to be completely destroyed while the upper and lower vertebrae reveal no evidence of disease. In the later stages of a severe case of osteomyelitis it is usually seen that when several vertebrae are involved they are surrounded by sclerosed bone and new bone formation surrounding the area of destruction. In tuberculosis, the patient usually has a predisposing condition such as malnutrition, debilitating disease, puberty, multiple pregnancies, and climacterium; in osteomyelitis there are no predisposing conditions inasmuch as the infection is caused by an organism that may appear at any time. It is also important to consider the speed of the development of these two conditions. Tuberculosis usually extends over months and years, while osteomyelitis shows rapid changes within a few days or weeks.

3. "Infectious spondylitis" shows symptoms and a course that lies between the acute course of osteomyelitis and a very protracted course of tuberculosis. The term "infectious spondylitis" comprises a multitude of infectious diseases of the spine caused by typhoid fever, paratyphoid, dengue fever, malaria, sprue, malta fever, Bang's disease, gonorrhea, smallpox, and scarlet fever.

The paper is concluded with the presentation of a number of cases illustrating tuberculous spondylitis, pyogenic spondylitis, and infectious spondylitis.

—*George I. Reiss, M.D.*

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

The Management of Varicose Veins with Special Reference to the Stripping Operation. THOMAS T. MYERS. *Surg. Clin. N. America*, 1955, 35: 1147.

THE RATIONALE of the stripping procedure in the treatment of varicose veins is that every vein interrupted or removed will help delay the return to varicosities. Treatment of varicose veins by stripping at the Mayo Clinic was begun by Charles H. Mayo in the early years of the century and he reported the results and technique in 1906. Stripping gave way to sclerosing therapy between 1927 and 1930; in 1937 high ligation was combined with sclerosing therapy. This form of treatment was continued exclusively until 1947.

From 1947 to 1949 at the clinic, a gradual swing occurred from ligation and injection therapy to partial stripping, and ultimately complete stripping. In 1949 stripping was employed in 91 per cent of the surgical procedures on the great saphenous vein and in 87 per cent of operations on the small saphenous vein. By 1950 stripping was used in 99 per cent of all procedures, and since 1951 in 100 per cent. By January, 1955, 4,550 stripping procedures had been done at the clinic.

The results prove that the more extensive the removal of the veins by operation, the longer the delay before a new venous pattern is re-formed. They have pointed the way for more extensive operation also. Since 1951 the technique has been improved at the clinic.

Indications for stripping incompetent superficial veins are: (1) the presence of large varicosities, (2) stasis changes such as dermatitis, ulcerations, pigmentation and chronic induration, (3) a history or evidence of a single attack or recurrent acute attacks of superficial phlebitis, (4) incompetence of both deep and superficial veins with venous stasis in which the superficial veins are a definite factor, and (5) need for a prophylactic procedure.

Contraindications may be classed as temporary and permanent or absolute.

The temporary contraindications to stripping are: (1) recent deep thrombophlebitis or acute superficial thrombophlebitis, (2) weeping dermatitis anywhere on the body, (3) suppurative disease anywhere on the body, (4) acute and subacute stasis cellulitis of the leg, (5) pregnancy, (6) poor general health or poor condition after a recent operation, (7) obesity, (8) severe secondary anemia with concentration of hemoglobin of less than 10 gm. per 100 c.c. of blood, (9) recent extensive sclerosing therapy, (10) early asymptomatic varicosities, (11) main complaint due to other diseases of the lower extremity, and (12) uncontrolled metabolic disease.

The permanent contraindications to be considered are: (1) marked arterial deficiency of the lower extremity, (2) normal but prominent-appearing veins, (3) asymptomatic varicosities occurring during advanced age, (4) severe deep venous insufficiency when mild varicosities do not appear to be a factor, (5) chronic lymphedema with minimal varicosities and also severe varicosities, unless the patient understands that the improvement of the lymphedema cannot be expected, and (6) severe constitutional disease with poor prognosis.

The complete paper includes data concerning diagnostic examination and procedures employed for commonly encountered types of incompetence of both the great and small saphenous veins.

Complications in the 1,189 procedures carried out at the clinic from 1947 through 1951 consisted of four postoperative episodes of thrombophlebitis, an incidence of 0.3 per cent, and three episodes of pulmonary emboli, only one of which was of a serious nature, an incidence of 0.2 per cent. Out of the 2,660 stripping procedures performed in the 5-year period there was one death from pulmonary emboli, an incidence of 0.037 per cent. No further fatalities have occurred to date.

Stripping interrupts the venous pattern efficiently. It destroys and breaks up collateral veins more extensively and offers more likelihood of solving the problem of the abnormal venous pattern than previous procedures did. It also may sever some incompetent perforating veins, even though they were not recognized preoperatively or at operation. Stripping also reduces sclerosing treatment required immediately after operation and for years in the postoperative follow-up.

The length of the operation is a distinct disadvantage, for at least one hour or more are required for each extremity. The multiple incisions increase chances of complications and multiple examinations are time-consuming. The surgeon who is performing a stripping operation must have a more thorough understanding of venous anatomy of the whole lower extremity than is required for ligation alone. The advantages far outweigh the disadvantages; therefore, stripping operations are used exclusively at the clinic in the treatment of varicose veins.

Peripheral Vascular Disorders in Diabetes Mellitus; a Survey of 3,000 Cases. DAVID W. KRAMER and PAUL K. PERILSTEIN. *Angiology*, 1955, 6: 408.

THE VASCULAR COMPLICATIONS in 3,000 consecutive cases of diabetes mellitus were reviewed and analyzed. The patients varied in their age, severity of diabetes, and degree of vascular changes. The cases were arranged in three series of 1,000 each, in chronologic order, and all cases were observed since the introduction of insulin.

Patients with vascular complications were graded into groups according to the clinical findings: (a) cases of potential gangrene included patients who had had symptoms of claudication or signs of deficient circulation, as determined by the pedal pulses, circulatory function tests, or x-ray evidence of atheromatosis, (b) cases of threatened gangrene included patients in whom there had been evidence of circulatory disturbances in the presence of cellulitis with swelling, discoloration, or ulceration of the digits; in these pa-

tients, gangrene could possibly have developed, but the condition had been controlled eventually and gangrene averted, and (c) cases of obvious gangrene in the toes, heel and dorsum of the foot of various types, caused either by arteriosclerosis, embolism, or, occasionally, by thromboangiitis obliterans.

The relationship between diabetes and the high incidence of vascular complications is an undisputed fact confirmed by clinical observations and autopsy statistics. The possible influence of abnormal cholesterol and lipoprotein metabolism, hyperglycemia, severity of the diabetes, and duration of the diabetes is discussed and considered as a probable etiological factor.

The statistical tables recorded in this publication indicate that there is an increased incidence of circulatory disturbances in the three groups of diabetic patients, from 17.3 per cent in Series 1 to 50.7 per cent in the last 1,000 cases. The statistical evidence places the cause neither on the diabetes per se or the severity of duration of the diabetes but favors the idea of atherogenesis resulting from disturbed metabolism of cholesterol, lipoproteins, and saccharides.

The practical application of this discussion poses the question of preventing gangrene. The problem of the future is to lower the incidence of the potential cases of gangrene by continued biochemical research, particularly in the areas of lipoprotein and polysaccharide metabolism. In this manner it may be possible to avoid the early and basic influences which produce the changes in the smaller vessels and eventually involve the large arterial system. —*John H. Mohardt, M.D.*

A General Conception and the Topography of the Thromboses of the Aortoiliac Segment (Concepto y topografía de las trombosis del segmento aortoilíaco). A. Elías Rodríguez. *Angiologia*, 1955, 7: 175.

Six cases of thrombosis of the arterial region, with photographic and abdominal aortographic illustrations, are reported. These case reports are intended to illustrate the clinical, operative, and aortographic findings and the results of treatment to be expected in this type of vascular disease.

All the types of vascular obstruction involving this arterial area, that is, the area extending from below the branching off from the abdominal aorta of the renal arteries to the beginning of the femoral arteries, are discussed. This, of course, includes the region of the aortic bifurcation, or "carefour" of Leriche, and the common, external, and internal iliac arteries as far as the inguinal arch. This entire arterial segment is considered as one anatomic, functional, and clinical nosologic entity, the differences in clinical manifestations being merely produced by the differences in the level at which the occlusive lesion develops. This is designated as the aortoiliac segment.

The first case was that of a 52 year old male with antecedents of cerebral syphilis and excessive smoking. Following an operation for an alleged acute appendicitis, the patient was seized with violent pains in the iliac fossae and presented evidence of ischemia in both lower extremities. Abdominal aortography, both direct and retrograde, disclosed complete occlusion of the abdominal aorta from a point beneath the renal arteries with marked development of the collateral circulation (chronic syndrome of Leriche). An aortoiliac arteriectomy with left lumbar ganglionectomy, and later a right lumbar ganglionectomy, was done with complete relief of all abnormal manifestations.

The second case was that of a 50 year old woman with extensive loss of use of both lower extremities and evidence of deficient blood circulation and of muscular atrophy. Abdominal aortography disclosed complete obstruction of the aorta between the third and fourth lumbar vertebrae. Bilaterally the external and internal iliac arteries appeared to be normal and were filled by way of the collaterals. Surgery was identical with that in the first case reported, again with total disappearance of the manifestations.

The third case was that of a 56 year old male with circulatory insufficiency of both the lower extremities and sexual impotence (obliteration of both internal iliac arteries?). Abdominal aortography disclosed an arteriosclerotic abdominal aorta below the level of the renal arteries, which was diminished in caliber and deformed in outline; the common iliac arteries were tortuous and of diminished caliber. There was a thrombosis of the left external and right internal iliac arteries. The collateral circulation was poorly developed. Surgery consisted of periarteriectomy of the aortoiliac bifurcation, arteriectomy of the left external iliac artery and, later, of the right internal iliac artery, with left and, later, right lumbar ganglionectomy operations. The middle toe of the right foot had to be amputated. Otherwise complete recovery of the patient resulted.

The fourth case was that of a 46 year old man with circulatory insufficiency of the lower extremities, more marked on the left side. The left lower extremity showed atrophic changes of the leg and foot. There was also diminution of the sexual potency. Arteriectomy of the left common and left iliac arteries and left lumbar gangionectomy were carried out. Later periarteriectomy of the right iliac artery and right lumbar ganglionectomy were added. The patient recovered both the use of his limbs and sexual potency.

The fifth case was that of a 25 year old male with pes varus equinus and circulatory deficiency of the lower extremities. There were muscular atrophy changes in these limbs, in the leg and foot regions, with absence of pulsation in the femoral arteries. Abdominal aortography disclosed a bilateral symmetrical obstruction of both the external iliac arteries. At operation external iliac arteriectomy was done on the left side together with lumbar ganglionectomy, and later these procedures were repeated on the right side. The aortoiliac bifurcation, and the common iliac and internal iliac arteries on both sides were intact (no loss of sexual potency). Complete recuperation of both extremities resulted, so that the pes varus equinus could later be corrected surgically.

The sixth case was that of a 32 year old male with circulatory insufficiency of both lower extremities, especially marked on the left side with atrophic changes in the leg and foot. Abdominal aortography disclosed a thrombotic obstruction of the left external iliac artery below the origin of the hypogastric artery. There was a marked arterial spasm in the area of the thrombosis in the left external iliac artery. At operation a thromboendoarteriectomy of the external iliac

artery and lumbar ganglionectomy were done on the left side. Complete recovery of the left limb resulted. In this patient, however, there later developed a generalized thromboangiitis of the right upper extremity and of both lower extremities. A subtotal bilateral suprarenalectomy was then carried out with immediate marked diminution of the ischemic manifestations. The patient was seen recently and was found to be in excellent physical condition and without ischemic manifestations.

There is an English summary appended to the article, which lists nine different nosological entities with symptoms and physical signs incident to occlusion at the various levels and sides of the body.

—*John W. Brennan, M.D.*

A Medical Massage Suit for Continuous Wear. JAMES P. HENRY, OWEN L. SLAUGHTER, and THEODORE GREINER. *Angiology*, 1955, 6: 482.

A MEDICAL MASSAGE SUIT for continuous wear with an automatic air inflation device was developed for exploring the therapeutic possibilities of the principle used in the antigravity suit. To permit continuous wear, the massage suit is fabricated as a "cutaway" garment made of light weight nylon which covers only the main muscle masses and permits free movement of the limbs. Counterpressure is applied with a capstan system which uses no bladders on the skin. The authors describe the device and discuss the effects of its rhythmic counterpressure on the circulation of the legs.

The principles involved are based on the antigravity suits used by World War II pilots in fighter craft who discovered that the muscle cramps and fatigue of long missions were relieved by any aerial maneuver abrupt enough to activate their antigravity suits. These protective devices compress the pilots' legs and abdomen with air bladders that automatically inflate when a high speed air craft changes direction of flight.

Circulatory effects demonstrated in the laboratory explained this prevention of muscular ache by the g-suit. In particular, venous pressure at the ankle was reduced to half the level it reaches in a man sitting quietly in hot clothing. As many as 400 ml. of blood could be displaced from the legs with a single inflation. The pilot's impression that periodic inflation of the g-suit provided some of the vascular benefits of moderate exercise was thus supported. A manual control button added to the g-valve allowed pilots to control venous return without acceleration-production flight maneuvers.

The authors reasoned that such convenient manipulation of the peripheral vascular bed might be applied to some of the problems encountered in angiology.

The physiological effects of the device were studied experimentally and they showed that the device is as effective as active exercise in removing blood from the lower extremities.

The device has not been used by the authors for treating disease, but they recommend a clinical investigation of its use in the treatment of arterial occlusive diseases, in lymphedema, in the maintenance of circulation during surgical procedures, and in solving the problems of phleobothrombosis and pulmonary embolism. There remains the evaluation of its possible role in the management of vascular disease and other disturbances of the circulation.

—*John H. Mohardt, M.D.*

SURGICAL TECHNIQUE

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Modern Concepts in the Treatment of Burns. CURTIS P. ARTZ and HARRY S. SOROFF. *J. Am. M. Ass.*, 1955, 159: 411.

MOST FIRST DEGREE and minor second degree burns can be treated on an outpatient basis. The involved areas should be thoroughly cleansed with soap and water, with the professional personnel wearing masks and using aseptic technique. All blisters are broken and dead epithelium is excised. Vaseline gauze and well padded dressings are applied, except on the face, and tetanus prophylaxis and antibiotics are administered. Dressings are changed in 5 to 10 days.

In certain moderate burns, including smaller third degree burns limited to areas where function is unlikely to be impaired, care may be satisfactorily undertaken in small community hospitals. More critical burns, for example the full-thickness burns of 30 per cent or more of the body surface or those involving important functional parts, such as the hands, face, or genitalia, should be referred to a large hospital with a surgeon experienced in the care of such burns.

In all major burns the initiation of general supportive care precedes the local care of the burn. The intravenous administration of morphine in 8 to 10 mgm. doses is recommended for the relief of pain. Intravenous tubing or a cannula, and a Foley catheter in the bladder are essential for regulating the fluid balance properly in burns of more than 25 per cent of the body surface. Tracheotomy is performed in all cases of third degree face burns and whenever respiratory damage is suspected. One million units of penicillin and a gram of streptomycin are given intravenously every 12 hours during the first 2 days.

In patients with burns of less than 15 per cent of the body surface, the electrolyte balance is maintained by the oral administration of a cold solution containing 3 gm. of sodium chloride and 1.5 gram of sodium bicarbonate per liter. When intravenous fluid replacement is indicated, a formula is used to outline the fluid therapy for the first 24 hours. For each per cent of body surface burned, 0.5 c.c. of colloid and 1.5 c.c. of electrolyte solution are given per kilogram of body weight. Burns of more than 50 per cent are calculated as if only 50 per cent of the surface were burned. Subsequent amounts are based on the clinical needs of the patient. Lactated Ringer's solution is recommended as an electrolyte, and dextran or whole blood as a colloid. Initial administration is rapid and the subsequent rate of flow is regulated to maintain a urinary output of 30 to 50 c.c. per hour.

After 48 hours, in critically burned patients, the serum sodium level must be observed and enough electrolyte-free water given to keep the serum sodium below 150 mEq. per liter. Otherwise the hypertonic interstitial fluids may draw water from the cells and cause intracellular dehydration and death. From the second or third day until oral intake is started, 80 to 130 mEq. of potassium are given daily in the intravenous fluids.

High protein and high caloric intake is essential and if oral intake is not established, intragastric tube feeding is started after the first week. Tube feeding in the first few days after a burn is dangerous because of gastrointestinal atony, and vomiting and aspiration may occur.

Cortisone therapy may decrease the patient's resistance to infection, one of the chief problems in burn management, so its use is contraindicated except when actual adrenal insufficiency can be proved.

The exposure method versus the occlusive dressing treatment of burns is discussed at length. Both methods have their advantages and both techniques should be mastered. The exposure method is especially applicable to partial-thickness burns of the face, the perineum, or of one side of the body. Painful and sometimes debilitating dressing changes are eliminated by the exposure technique and infection is less likely. Occlusive dressings provide better immobilization and more prompt relief of the initial pain, and they are universally applicable to all parts of the body or to burns combined with other soft tissue trauma or fractures.

Immediate excision and grafting are sometimes applicable in full-thickness burns of a small area. However, more often the eschar is removed after 2 or 3 weeks, granulations are allowed to form, and split-thickness skin grafts are applied. The exposure technique may be used in managing the donor area. Postmortem homografts are utilized occasionally to produce a temporary closed wound so that nutrition and fluid balance in a debilitated patient may be improved.

Death following severe burns has often been blamed on a so-called toxemia. However, this is most often a septicemia, and mortality can be reduced most effectively by measures controlling or preventing septicemia. With a larger percentage of patients surviving severe burns, the incidence of gastrointestinal ulcerations is increasing. —*Stanley W. Tuell, M.D.*

Postmortem Skin Homografts in the Treatment of Extensive Burns. CURTIS P. ARTZ, JERROLD M. BECKER, YOSHIO SAKO, and ALVIN W. BRONWELL. *Arch. Surg.*, 1955, 71: 682.

EARLY DEATHS from extensive burns are successfully prevented in many patients by careful management of fluid-electrolyte balance; however, many of these patients die later from complications (continued fluid loss, protein loss, and infection) which develop as a result of their large open wounds.

Ideally the burned areas should be grafted with autogenous skin, but in many of these patients there is a lack of donor sites; also, these severely ill patients seldom tolerate the anesthesia and additional trauma produced by the removal of donor skin. Skin homografts provide a temporary coverage of the wound which may allow the general condition of the patient

to improve while autogenous sites become available. Skin homografts may be applied on the granulating surfaces during a dressing change and without anesthesia. Following this procedure there is less infection, less fibrosis, and less discomfort.

Postmortem homografts have previously been used successfully. The use of cadaver skin instead of the skin of living donors is less expensive and obviates the pain, inconvenience, and morbidity incurred to the donor.

Split thickness skin 0.012 to 0.015 of an inch thick is removed from the cadaver in the operating room under sterile conditions as soon after death as possible (average about 6 hours). Prior consent is secured from the relatives. Patients dying of cancer, tuberculosis, syphilis, septicemia, homologous serum hepatitis, other communicable diseases, or diseases having cutaneous manifestations are not suitable donors. After removal, the skin is placed on fine-mesh vaseline gauze with the cut surface away from the gauze. It is then folded so that the raw surfaces of the skin are in apposition, and placed in a covered container to which is added one million units of penicillin and one gram of streptomycin in 20 to 30 cubic centimeters of isotonic saline. It is then stored in an ordinary refrigerator. Successful takes have followed the use of postmortem skin stored as long as 7 or 9 days.

Five cases are reported, the patients having 50 per cent to 70 per cent total body burns. The average survival of homografts was 3 to 4 weeks. One 10-year-old girl with a 60 per cent body burn, of which 45 per cent was third degree, underwent nine homografting procedures.

The majority of these patients began to show distinct improvement following the application of sheets of postmortem homografts. As autogenous donor sites became available, postage stamp autografts were taken and applied as the homografts disappeared.

The authors believe it is easier to obtain consent for the removal of postmortem skin than to obtain consent for autopsy. —*Bernard C. Gerber, M.D.*

Antiobiotic-Resistant Staphylococcal Infection; a Study of Antibiotic Sensitivity in Relation to Bacteriophage Types. MARY BARBER and JOHN BURSTON. *Lancet*, Lond., 1955, 2: 578.

IN THE PRESENT era of antibiotics, staphylococcal infections remain one of the major problems of surgery, because of their unlimited capacity to yield antibiotic-resistant variants. A great number of hospital infections today are due to strains of Staphylococcus aureus, which are resistant to all antibiotics and which occur even when good aseptic control is exercised. The present investigation was undertaken to determine whether the reasons for this failure could be elucidated.

Of 62 babies born in a hospital maternity unit during the period between January and March, a total of 89 per cent left the hospital carrying penicillin-resistant strains of staphylococcus aureus in the anterior nares. A study of antibiotic sensitivity patterns and bacteriophage types suggested that in most cases the babies had acquired the organisms from the nurses rather than from the mothers.

During the period between November and April, strains of Staphylococcus aureus were isolated from 100 infective processes in other departments; 59 of these were resistant to penicillin, 30 to streptomycin, 26 to oxytetracycline, and 3 to chloramphenicol.

Most of the antibiotic-sensitive strains were isolated from outpatients or from new patients with closed abscesses on admission, whereas a large number of antibiotic-resistant infections appeared to have resulted from hospital cross-infection.

Of 24 infective processes yielding strains resistant to penicillin, streptomycin, and the tetracyclines, 17 followed surgical operation and the remaining 7 occurred in chronic hospital patients while under treatment for other conditions. The source of these infections is discussed.

All the strains showing multiple resistance reacted to bacteriophages of group 3.

—*Ely Elliott Lazarus, M.D.*

ANESTHESIA

Anesthesia for Cardiac Surgery. A. J. PARRY BROWN and B. A. SELLICK. *Brit. M. Bull.*, 1955, 11: 174.

THE AUTHORS present in detail the anesthetic management of cardiac surgery in the light of their experience with 800 cases.

The teamwork between the cardiologist and the anesthetist is of utmost importance. It is essential that the anesthetist gain the confidence of the patient so that, as far as possible, the patient comes to the operation relaxed and free of emotional disturbances which can precipitate pulmonary edema.

Pantopon (10 to 20 mgm.) and demerol (50 to 100 mgm.), used for sedation, are given from one to one and a quarter hours preoperatively. In children pantopon (2.5 mgm.) and demerol (10 mgm.) per 14 pounds of body weight are used. Atropine and scopolamine are omitted where tachycardia or cardiac irritability is feared. Chlorpromazine is not helpful since it may produce hypotension and tachycardia.

Topical anesthesia of the larynx is performed either by laryngeal spray or transtracheal injection; xylocaine (4%) is used. Intravenous thiopentine (2.5%) is used for induction or is administered slowly to diminish the possibility of hypotension. With the patient asleep, tubocurarine chloride (15 to 30 mgm.) is administered intravenously; at the height of muscle relaxation an oral endotracheal tube is passed. Following intubation, positioning of the patient on the operating table is carried out slowly to avoid postural hypotension. The next step is the performance of a paravertebral block, with 0.5 per cent xylocaine; this block serves to reduce the quantity of general analgesic agents needed during maintenance of anesthesia and to reduce the postoperative wound pain for several hours.

Controlled respiration is considered essential in all but the simplest cases. Controlled respiration diminishes the risks of hypoxia and carbon dioxide retention. Also, controlled respiration offers the surgeon a quiet operative field. Assisted respiration is contraindicated since it predisposes to hypercapnia and hypoxia and may cause unwanted respiratory movements during difficult phases of surgery.

Anesthesia is maintained with the use of a mixture of 60 per cent nitrous oxide and 40 per cent oxygen,

with a total flow of 5 liters per minute. In resistant cases and in prolonged operations, additional doses of tubocurarine may be needed to maintain the apnea for controlled respiration; also, additional analgesia may be achieved with additional doses of intravenous demerol (20 to 25 mgm.), given no more than twice. As far as possible, thiopentine is not used during maintenance in view of the cardiodepressant effects of this agent.

Embolization is a grave risk in operations for the relief of mitral stenosis. To reduce the hazard of embolism, compression of the carotids in the neck or within the chest may be used.

Direct surgical stimulation of the heart produces many bizarre patterns of arrythmias. Hypoxia and hypercapnia may do the same. Procaine and procaine amide are not used to prevent arrythmias; these drugs can produce hypotension and myocardial depression.

Cardiac arrest, ventricular fibrillation, and severe hemorrhage are omnipresent hazards.

Induced hypotension is not used in most cases; however, it is useful in operations for relief of coarctation of the aorta; reduction in the blood pressure makes the anatomical dissection and preparation of the field for suture or grafting much safer. Hexamethonium is used for ganglion blockade.

—*Robert Turell, M.D.*

Anesthesia in the Splanchnicectomized Patient. MELVIN S. KAPLAN and JULIA G. ARROWOOD. *Surgery*, 1955, 38: 470.

A REVIEW is presented of 138 anesthetic procedures in 89 previously splanchnicectomized patients. The cases were tabulated according to time interval between splanchnicectomy and second operation, surgical procedures, and postoperative complications.

There were all types of surgery at various times following bilateral splanchnicectomy. In the management of these patients during surgery there was concern regarding hypotension. However, 86 patients required no vasopressor drug either during surgery or in the immediate postoperative period. It was found that these patients were able to withstand the stress of anesthesia and surgery provided the basic principles of support of circulation, blood replacement, and adequate oxygenation were maintained. These patients may exhibit considerable drop in blood pressure when anesthesia is induced, which, if not treated, may result in cardiovascular collapse with serious cardiac and cerebral sequelae, or may even be fatal. Deep anesthesia is to be avoided, if possible, preference being given to the curare drugs for muscular relaxation. Selection of the anesthetic agent or method is less important than an understanding of the physiologic principles underlying the management of the patient.

—*Mary Karp, M.D.*

A Long-Term Follow-Up of 10,098 Spinal Anesthetics; Incidence and Analysis of Minor Sensory Neurological Defects. LEROY D. VANDAM and ROBERT D. DRIPPS. *Surgery*, 1955, 38: 463.

AN ANALYSIS is made of a series of 10,098 spinal anesthetics. Seventy-one patients (0.8%) had residual signs or symptoms of numbness following spinal anesthesia, this numbness being restricted, in the majority of cases, to lumbar and sacral areas of the body. This condition was not progressive and most complaints disappeared within a period of 6 months. Neither the size of the needle nor the agent used, nor the number of punctures made appeared to influence the development of numbness; it was the spinal anesthetic itself that seemed to play a nonspecific part in this phenomenon. There was a similarity of the neurological complaints described with "meralgia paresthetica." In approximately one-half of the patients the area of numbness coincided with the distribution of the lateral femoral cutaneous nerve.

The complaints reported in this article were of minor significance in the lives of the individuals affected. There were no instances of cauda equina, myelitis, or meningitis. —*Mary Karp, M.D.*

Accidents with Hypotensive Anesthesia (Les accidents de l'hypotension provoquée). A. GOLDBLAT. *Acta anesth. belg.*, 1955, 6: 14.

THE CASE of a complication of hypotensive anesthesia in a 70 year old female who underwent a mastectomy for cancer of the breast is reported. Preoperative examination revealed no abnormalities of the heart or lungs. The operation lasted an hour. Hypotension was maintained during this hour with arfonad (0.1% solution) administered at the rate of 60 drops a minute. The pressure was lowered from a normal of 145 systolic and 90 diastolic to an average of 80 systolic and 60 diastolic. Ten minutes after discontinuation of the arfonad the pressure returned to 120 systolic and 80 diastolic. Forty hours postoperatively the patient became jaundiced and developed a left hemiplegia. The patient ultimately recovered.

Hypotensive anesthesia is not well tolerated in elderly arteriosclerotic patients. Several factors may have been responsible for the cerebrovascular accident in this case: cerebral arteriosclerosis, an added effect of premedication, anoxia of the cerebrum during hypotension, abnormal carbon dioxide tension, and acidosis.

The jaundice is the result of focal necrosis in the liver secondary to anoxemia. The liver does not tolerate hypotension below 60 mm. of Hg systolic pressure.

—*Frederick W. Preston, M.D.*

The Anesthesiologist and the Atomic Danger (L'anesthésiologiste devant le danger atomique). ERNEST KERN. *Can. anesth.*, 1955, 3: 231.

AFTER A BRIEF DISCUSSION of the physical principles of uranium and thermonuclear bombs, the author describes the effects of atomic arms on the organism, the symptomatology and treatment of radiation sickness, and the role of the anesthesiologist in case of an atomic attack.

The effect on the organism is threefold: mechanical injury by blast, burns, and injury by radioactivity.

It is surprising how resistant the living matter is against the direct effects of blast, infinitely more than any kind of man-made structure. As an example, the author mentions that practically no ruptured eardrums were observed at Hiroshima. The blast injuries, fractures, cuts, and contusions were always caused indirectly by debris hitting the person.

Although the heat at the center of the explosion reaches about one million degrees centigrade, it de-

creases rapidly in proportion with the distance and penetrates little so that ordinary clothing acts as an effective screen. Most burns at Hiroshima affected the face and hands only; beyond 1,500 meters from the center of the explosion very few burns were fatal and beyond 2,500 meters few were grave. Woolen clothes provide better protection than silk or cotton as wool is not inflammable.

Radiation injury is caused either by neutrons or by beta or gamma rays. Exposure to neutrons is immediately fatal. However, neutrons are present only at the site of the explosion. By colliding with atoms they lose energy rapidly and are finally caught by a nucleus to form instable radioactive isotopes. Also the beta rays lose their energy at a short distance, and their danger is negligible at the time of the explosion. They can, however, become dangerous when radioactive gases are inhaled or contaminated water or food is ingested.

By far the most dangerous are the gamma rays because of their power of penetration. At Hiroshima they were fatal within a radius of 1,500 meters. However, at this distance a cement wall of 50 cm. thickness provides sufficient protection.

The mechanism of the biologic action on the organism is not known. It has been hypothesized that the atoms constituting the cell and especially the nucleus are altered, or that the water molecules undergo a modification. The sensitivity of the different tissues is very unequal, the most sensitive tissues are, in this degree: (1) the hematopoetic organs of the white cells, including the spleen and lymph nodes; (2) the red bone marrow; (3) the gonads; (4) the mucosa of the gastrointestinal tract; and (5) the skin.

The symptomatology of radiation sickness is described briefly. The first symptoms, several hours after exposure, are vomiting, diarrhea, headache, and general weakness. Ten to 15 days later marked leukopenia, erythropenia, and thrombocytopenia appear. As a sequel to the blood dyscrasia, infections of the skin, mucous membranes of the mouth, gastrointestinal, and respiratory tract are frequent and the principal cause of death in this stage. Superficial and deep hemorrhages occur practically always and increase the anemia. This stage lasts several months; individuals who survive it usually recover permanently. During the 10 years since Hiroshima no increased incidence of leukemia, cancer, or other pathology has been observed in the population, except for a higher incidence of cataracts. Infants exposed to radiation developed normally, and no increase of congenital malformations was observed in the children born during this period. The geneticists assume that it will take several generations before damage of the germ plasm manifests itself in a higher incidence of malformations.

The treatment is purely symptomatic and includes prophylactic use of broad spectrum antibiotics, frequent transfusions of fresh blood, and the maintenance of electrolytic equilibrium. Patients suffering from radiation sickness are not dangerous for their surroundings, and no special protection of the nursing staff is necessary.

The task of the anesthesiologist during and after an atomic attack includes treatment of shock, blood and expander transfusions, administration of analgesics, and anesthesia appropriate for the particular conditions of the bombed area. Modern anesthesia equipment will probably not be available because of the destruction of buildings and disorganization of supplies. Ether and ethyl chloride should not be used because of their inflammability, nor chloroform because of its toxicity. The treatment of choice will be intravenous anesthesia, combined with curare, if necessary. As sufficient oxygen will not be available, air insufflators should be stocked in great quantity. These proved very effective in the Normandy landing battles. —*Werner M. Solmitz, M.D.*

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

The Early Recognition of Premature Cranial Synostosis. JOHN W. HOPE, EUGENE B. SPITZ, and HARRY W. SLADE. *Radiology*, 1955, 65: 183.

THE PURPOSE of this article is to point out the early clinical and roentgen findings of premature cranial synostosis.

There are two phases to this disease. The first phase is that of compensation which occurs as long as the uninvolved sutures can separate enough to allow the normal growth of the brain. The second phase is that of decompensation which occurs when the cranial vault can no longer expand adequately, and permanent neurologic injury results.

The authors state that the diagnosis must be made early and the treatment carried out before the phase of decompensation is reached.

There are few physical findings present in the early stages of this disease. There frequently is an abnormally shaped head with palpable ridges over the closed sutures and, occasionally, exophthalmos when suture closure results in a shallow anterior fossa.

Because of the paucity of these early physical findings, it is frequently necessary to rely on x-ray for the diagnosis. There is a great deal of variability in the roentgen appearance of the sutures during early life; however, a suture which will close prematurely usually is very narrow and has dense margins. After closure of the suture has taken place, there is evidence of expansion of the unaffected sutures and an abnormal contour to the cranial vault (the authors present the roentgen manifestations associated with involvement of the various sutures, or combination of sutures). Later, when the above means of compensation become inadequate and there is increased intracranial pressure, thinning of the inner table of the skull with prominence of the convolutional markings is noted. There may be depression of the orbital plates and even spontaneous herniation of the brain.

The main differential diagnosis is between premature cranial synostosis and cerebral dysgenesis. In cerebral dysgenesis the sutures do not close, but because the brain in this disease does not exert the normal expanding pressure on the calvarium, the sutures narrow and occasionally overlap, producing a false roentgen appearance of closed sutures with dense margins. For the same reason, however, there are no convolutional markings on the inner table of the skull, distinguishing this disease from cranial synostosis.

The authors believe that the best form of treatment today consists of a linear craniotomy alongside the involved suture, or sutures, with polyethylene strips sewed over the raw bone edges to retard the formation of new bone.

Since the brain doubles its weight in the first 7 months and triples its weight in 30 months, this operation should be performed before the age of 6 months, and preferably at about 3 months of age.

This article contains 29 excellent roentgenograms and 5 case histories. —*Richard E. Ernst, M.D.*

Extraluminal Localized Gas Vesicles; an Aid in the Diagnosis of Abdominal Abscesses from the Plain Roentgenogram. W. WAYNE SANDS. *Am. J. Roentg.*, 1955, 74: 195.

THE AUTHOR emphasizes that unnoticed and undervalued signs are hidden in the shadows of the plain abdominal roentgenogram. Particularly overlooked are localized extraluminal, spherical areas of decreased density which represent gas within abdominal abscesses. These areas are frequently the only roentgenographic evidence of an abscess and they are often of value in determining its exact site. Such information may influence the method of treatment and the placement of incisions.

Twelve cases from the literature are reported, and the author presents 10 cases of his own in which localized extraluminal, spherical areas of decreased density on the abdominal roentgenograms were of diagnostic value, and upon operation they proved to be infections or abscesses.

The frequency of this finding is stressed, as well as the fact that often they may be the only roentgen sign of abscess. —*Luther W. Brady, M.D.*

Cholegraphy; the New Contrast Medium Biligrafin. HEINZ OESER and WALTER FROMMHOLD. *Acta radiol.*, Stockh., 1955, 43: 355.

IN AN HISTORICAL REVIEW, the authors discuss four phases in the development of agents used in the roentgen examination of the gallbladder and biliary tract. The first phase included the use of sodium tetraiodophenolphthalein intravenously, which caused frequent unpleasant side effects. The second phase ushered in the use of oral preparations such as biliselecton (priodax). These were less toxic than the phenolphthalein derivatives. The third phase was an improvement over the second, because of the addition of three iodine atoms to the molecule of the contrast agent; the new agents were known as telepaque, teridax and triodan. The fourth phase has been the introduction of biligrafin, a contrast material of low toxicity which can be administered intravenously.

Among the disadvantages of the oral contrast agents has been the not infrequent finding of opaque residues in the bowel. The determination of the extent and speed of absorption of these materials was unsatisfactory.

The contrast agents used in the second and third phases are excreted chiefly via the urinary tract, only 20 to 40 per cent being recovered from the feces. The concentration in the bile is too small to permit visualization of the intrahepatic ducts and only rarely can one see the extrahepatic ducts.

The advantage of biligrafin is due to the fact that nearly 90 per cent is excreted via the liver into the bile and feces, while only about 10 per cent is lost via the urine. These statements have been substantiated

by thorough clinical and laboratory investigations. At present the authors recommend the use of 20 cubic centimeters of a 40 per cent solution of biligrafin. The optimum concentration in the gallbladder is reached in about 2 hours.

Gallbladder function can be tested as usual with a fatty meal. One should not be confused by layer formation of the contrast material within the gallbladder due to difference in specific gravity between it and bile.

In studying the bile ducts, optimum visualization is obtained in from 40 to 90 minutes after injection. Two cases illustrating calculi in the common bile duct after the injection of 20 cubic centimeters of a 40 per cent biligrafin solution are shown.

Excretion of the contrast material into the duodenum is in such high concentration that the duodenal loop can frequently be observed and studied.

Further investigation is necessary to determine whether biligrafin can be used to evaluate liver function.

Untoward side effects are found only in from 5 to 20 per cent of patients. These consist of mild nausea and (rarely) vomiting and a lowering of the blood pressure. The injection of 20 cubic centimeters of the 40 per cent solution of biligrafin should take 5 to 6 minutes. No deaths have been reported (at the time of writing) in 40,000 examinations.

—*David J. Stephenson, M.D.*

The Roentgenographic Diagnosis of Genital Tuberculosis in the Female and Roentgenographic Effects of Antibiotic Therapy. KRISTINA EKENGREN. *Acta radiol.*, Stockh., 1955, Supp. 123.

IN THE PRESENT 97-page treatise, the author discusses the roentgenologic findings in 117 cases of genital tuberculosis examined by hysterosalpingography with use of a water-soluble medium. The findings were divided into three groups of almost equal size:

1. Fallopian tubes showing thickening of the mucosal folds. Histologic examination showed these thickened folds to be due to granulomas or hypertrophic changes.

2. Tubes of irregular contour showing loss of mucosal pattern. Histologic examination revealed destructive lesions and occasional traces of villi.

3. Tubes lacking a mucosal pattern, occluded in the isthmic or ampullar portion, and also slightly dilated. A clublike distal appearance was common.

Changes in the uterus revealed small nonspecific cavities in the endometrial cavity or endocervix, and, more typically, marked deformation of the uterine cavity with fistulalike formation.

Genital calcifications were demonstrated only in advanced tubal lesions.

Differential diagnostic points were emphasized: (1) extensive hydrosalpinx rarely occurs with tuberculosis; (2) occasional narrow mucosal folds were not found with tuberculosis; (3) moderate hypertrophic mucosal pattern may be either tuberculous or nontuberculous; (4) very marked mucosal thickening occurred only in tuberculosis; (5) tubes of irregular contour with absence of mucosal pattern were almost conclusive evidence of tuberculosis, as was the finding of clublike tubes with ampullary stricture; (6) tuberculosis was almost always bilateral; (7) tuberculous endometritis with roentgenographically demonstrable changes in the tubes is evidence of tubal tuberculosis.

The author was able to follow 47 cases under chemotherapeutic management, noting regression of the abnormal mucosal pattern in some cases, and the development of strictures in others. The author feels that regression can occur if the disease is limited to the mucosa, but with more destructive lesions, stricturing is more common.

In only 4 of 215 hysterosalpingographic examinations did inflammatory complications occur. Use of carboxymethyl cellulose was discontinued when it was pointed out that this substance could lead to the formation of granulomas.

There are 45 excellent radiographic reproductions.

—*Moris Horwitz, M.D.*

Renal Function Following Aortography Carried Out Under Ganglionic Block. HERMAN LODIN and LARS THORÉN. *Acta. radiol.*, Stockh., 1955, 43: 345.

FROM a review of the literature, the authors observed that in the investigation of renal lesions and certain vascular diseases by means of aortography, there is a possibility of damage to the liver and kidneys, due to trauma from the rise in aortic pressure during injection, or to toxic or allergic reactions to the contrast medium.

Since the summer of 1954, the authors performed aortographies on 15 patients on whom preaortographic and postaortographic renal function tests were carried out. The renal functions were determined on the two days preceding aortography, and on the first, second, third, and seventh days following the procedure. Their technique for aortography is described and includes the use of ganglionic block by tetra-ethyl-ammonium bromide to produce hypotension of 100 to 120 mm. Hg. in hypertensive patients and 80 to 90 mm. Hg. in normotensive patients. Thirty milligrams of urokon (70%) are introduced via a catheter which has been percutaneously introduced into the femoral artery or into the aorta by translumbar puncture. Morphine and scopolamine are given one hour before the examination, and 10 minutes before the injection of the contrast medium the patient receives from 25 to 75 mgm. of pethidine intravenously—no further analgesia being used. Oxygen is given during the procedure. Following injection of the contrast medium, the blood pressure is rapidly raised to the original levels with small injections of ephedrine, and maintained. The period of hypotension is about three minutes as a result of the ganglionic block.

The renal function tests performed were: (1) urine, (2) Heller's test, (3) specific gravity of first morning specimen, (4) Addis count and 24 hour volume excretion. Blood tests consisted of the daily estimation of nonprotein nitrogen; and serum protein, chloride, and bicarbonate were estimated before, and on the third day after, the investigation. Endogenous creatinine clearance tests were also done on the two days preceding the investigation and on the first, second, third, and seventh days afterwards. The blood pressure was recorded.

The present investigation showed no impairment of renal function in 15 cases examined under ganglionic

block and only one case of temporary renal failure among 40 earlier cases so examined. This they believed due to an allergic or toxic reaction.

The authors conclude that the risks of renal damage in aortography carried out with the technique described are small and they believe that tests of renal and liver function should precede aortography. Aortography should not be performed in the presence of diffuse parenchymatous lesions.

—*J. Olin Perritt, Jr., M.D.*

The Side Effects of Biligrafin. GEORG THEANDER. *Acta radiol.*, Stockh., 1955, 43: 369.

THE AUTHOR describes the side reactions that were observed in connection with 500 consecutive cholegraphic examinations with biligrafin. The sodium salt of biligrafin (20 per cent concentration) was used in 431 of these examinations. The lithium salt (40 per cent concentration) was used in 69 unselected cases. The dose of the contrast medium was from 8 to 12 gm. In children the dose was reduced according to body weight.

The biligrafin was injected slowly and on the appearance of side effects it was discontinued. Slight general discomfort, dizziness, flushing, perspiration, and nausea of short duration were fairly common reactions which were not listed as side effects.

Untoward reactions were classed as early (during or soon after the examination) or late. Side reactions occurred in 7.8 per cent of the cases—5 per cent being early and 2.8 per cent being late effects. The early side effects noted on 25 occasions (5 per cent) were biliary colic, profuse vomiting, signs of circulatory collapse, lacrimation, coryza and sneezing, edema of the face, diarrhea, and urticaria. The late side effects noted on 14 occasions (2.8 per cent) were protracted nausea with vomiting, biliary colic, and diarrhea.

Age and sex had no definite bearing on the frequency of the side reactions. Patients receiving more than one dose of biligrafin did not have any increase in side reactions, which would suggest that biligrafin did not induce hypersensitization. Because of the decreased number of side reactions on jaundiced patients, it appears that jaundice protects the patient from undesired effects of biligrafin and thus provides further support for the assumption that jaundice exerts an anti-allergic effect.

No side reactions were seen on the 69 occasions that lithium salt of biligrafin (40 per cent) was used.

The author presents a summary of the literature dealing with the side effects of biligrafin.

—*James A. Lyon, Jr., M.D.*

The Effect of Two Million Volt Roentgen Therapy on Various Malignant Lesions of the Upper Abdomen. RUTH J. GUTTMANN. *Am. J. Roentg.*, 1955, 74: 204.

THE AUTHOR presents 40 cases of patients who were treated with two million volt roentgen therapy for various malignant lesions of the upper abdomen. All the patients were symptomatic and all the lesions were far advanced primary and metastatic carcinoma.

The majority of the patients were given 4,000 to 4,500 roentgens in 4 to 4.5 weeks through large fields directed over the upper abdomen, although 3 patients received 2,400 roentgens in 8 elapsed days. Of the 40 patients treated, 9 died during or shortly after completion of radiotherapy. Of the remaining 31 patients, 25 were definitely improved. Some are living at 2.5 years.

The author points out that these patients do tolerate, fairly well, intensive roentgen therapy given through large fields directed over the upper abdomen and that a great deal can be done for patients with far advanced malignant disease.

—*Luther W. Brady, M.D.*

MISCELLANEOUS

The Treatment of Malignant Serous Effusions with Radioactive Colloidal Chromic Phosphate. HENRY L. JAFFE. *Am. J. Roentg.*, 1955, 74: 657.

THE AUTHOR discusses his method of treatment, the problems, and the results obtained with the use of radioactive colloidal chromic phosphate in the management of malignant serous effusions in the peritoneal and pleural cavities. He compares his work with work previously done elsewhere, in which radioactive colloidal gold was employed. It is believed that the weak gamma radiation present in the gold preparations is of little value, and that the use of the pure beta radiation which is present in colloidal chromic phosphate is not only effective, but presents none of the problems concerned with the protection of personnel and the rapid decay of the medium. The use of colloidal chromic phosphate is apparently also considerably less costly than the use of colloidal gold, and it is pointed out that colloidal gold must be injected while the patient is hospitalized, whereas colloidal chromic phosphate may be used for outpatients when feasible.

A new syringe which is designed to give practical and complete protection to personnel using the medium for injections is described. The problem of cortical size in the preparation of the medium, and a method for its control is suggested.

Radioactive colloidal chromic phosphate has been used by the author in 30 cases of pleural effusion and in 20 cases of ascites. Of the 30 patients with pleural effusion, two-thirds showed improvement; of the patients with ascites, 60 per cent were improved.

Radioactive colloidal chromic phosphate apparently is as effective as colloidal gold in the control of effusions of serous cavities and is apparently a worth while addition to our clinical therapeutic armamentarium.

—*Moris Horwitz, M.D.*

The Use of Radioactive Gold in the Treatment of Effusion Due to Carcinomatosis of the Pleura and Peritoneum. MORTON M. KLIGERMAN and DAVID V. HABIF. *Am. J. Roentg.*, 1955, 74: 651.

THE AUTHORS discuss their use of radioactive colloidal gold in the treatment of 35 patients with effusion due to carcinomatosis of both the pleura and peritoneum. The side effects and protection problems from the use of this medium are also described. Protection becomes a problem insofar as personnel is concerned because of the weak gamma rays present. The authors have found, as have others, that where solid masses of tumor are present in the pleura and peritoneum, the radioactive gold has little effect on the solid mass per

se. There was, however, good palliation in a significant percentage of cases (9 of the cases of pleural carcinomatosis and 14 of the cases of peritoneal carcinomatosis) to justify the use of this medium as a palliative measure, insofar as controlling recurrence of fluid both in the pleural and peritoneal cavities was concerned. —*Moris Horwitz, M.D.*

Radiation Sickness in Man Following the Administration of Therapeutic Radioiodine; The Relationship Between Latent Period, Dose-Rate, and Body Size. JOHN D. ABBATT and W. M. COURT BROWN. *Brit. J. Radiol.*, 1955, 28: 358.

IN 28 OUT OF 38 PATIENTS who had received the total of 44 doses of I^{131}, the authors observed the appearance of symptoms of radiation sickness similar to that noted and described by other authors after the administration of single doses of x-ray therapy. The patients followed by the authors were treated with radioactive iodine for a variety of conditions varying from thyrotoxicosis to carcinoma of the thyroid. The doses of I^{131} administered varied from 29.0 to 200 mc. The symptoms of radiation sickness following the dose of radioactive iodine may occur, according to the authors, in two phases, the first of which occurs within 24 hours of the drug's administration, and the second, which is not present without being preceded by the initial sickness, occurring between the fifth and ninth day after administration of the radioactive iodine. In the initial phase of the symptomatology with a latent period varying between 4 and 14 hours, the symptoms noted were those of fatigue, headache, nausea and, occasionally, some vomiting. It is also noted that patients who received radioiodine intravenously had relatively little in the way of a decreased latent period, compared with those who were given the radioiodine orally.

The authors noted that the second phase of symptomatic illness occurred in 11 of the 28 patients observed who had the initial phase symptoms. They also noted that the second bout or phase was less severe than was the first phase. The second-phase symptoms were also commonly associated with the local symptomatology "radiation thyroiditis."

It was noted that radiation sickness which does occur after the administration of radioiodine is very similar to that occurring after a single dose of medium voltage roentgen therapy. There is definite correlation between the length of the latent period, both in roentgen therapy and in therapy with radioactive iodine relative to the body size of the patient.

Further correlation is apparent in the dose rate and in the production of the symptoms of radiation sickness.

This article is recommended for all who deal with ionizing radiations. —*Moris Horwitz, M.D.*

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

The Effects of Experimental Hypothermia on Vital Organs. PHYLLIS KNOCKER. *Lancet*, Lond., 1955, 2: 837.

THE PRESENT study was undertaken in order to determine whether any histochemical changes during hypothermia could be demonstrated. The liver, adrenal glands, and kidneys were studied in animals undergoing experimental hypothermia. Thirty dogs were used in the study; all were mongrels and all were in good general health. Biopsies prior to cooling were taken from the liver, the kidney, and in some instances from the adrenals. Frozen sections and wax imbedded specimens were made of each biopsy.

The animals were cooled in an ice bath maintained at 4 degrees C. Assisted respiration was given when the respiratory rate fell below six per minute. Some of the early animals were cooled until death supervened. Later they were cooled to about 25 degrees C., the point at which arterial and venous blood are identical in color.

The frozen sections were stained with a mixture of Sudan III and Sudan IV for lipoids, and the wax imbedded specimens were used to study glycogen, cytoplasmic granules, and cell structure.

After hypothermia had been maintained for two and one-half hours the following changes were noted:

Liver. The whole tissue took on a bluish discoloration from the Sudan stain, indicating an increase in fat deposition. The liver cells lost their definition and the nuclei became faint. The normal liver biopsy contained only occasional fat droplets. The normal liver contains narrow sinusoids and is full of glycogen. The liver sinusoids of the cooled animals were widely dilated and most of the glycogen had disappeared. The dilated sinusoids were filled with congested red cells.

Adrenals. The normal gland shows the zoning into the outer zona glomerulosa, medial zona fasiculata, and innermost zona reticularis, most of the sudanophilic substance being located in the outer zone. Following hypothermia for two and one-half hours the lipoid of the adrenal was markedly increased especially in the innermost zona reticularis. Staining of the cooled specimens with Mallory's triple dye showed the zones to be still present and, as hypothermia was continued, vacuolation occurred—most marked in the zona reticularis. This paralleled the appearance of fat in this zone during cooling.

Kidney. Normal kidneys show some fat in the tubules but this was much increased in the cooled animals. Sudan staining material had collected in almost every tubule. In many tubules the cells were so full of fat that the lumen appeared to be occluded. The glomeruli and upper nephron were free of change.

The collection of fat in the liver appears to be of serious import and parallels that seen with toxic agents such as chloroform, with congestive heart failure, and with tissue anoxia. These changes were not found in any of the control group or in any of the animals maintained in the anesthetic state for 4 hours without hypothermia.

Increase of fat in the frozen sections and increased vacuolation in the wax sections probably represent one and the same process. This change increases more and more as death approaches, and is considered a serious omen.

During hypothermia fat accumulates in the lower nephron. This may be due to the direct effect of cold on the kidney or the tubule itself. Urinary flow during hypothermia, as measured by Nedzel, gradually decreases and finally ceases at about 25 degrees C. Shunting of the blood away from the kidney apparently occurs and this may be in compensation for the fall in arterial blood pressure.

These changes were demonstrated in all animals undergoing hypothermia. Whether or not they are irreversible cannot be determined without survival experiments.

Excellent colored photomicrographs accompany this paper. —*John H. Davis, M.D.*

The Operative Risk in Patients with Coronary Heart Disease. BENJAMIN ETSTEN and SAMUEL PROGER. *J. Am. M. Ass.*, 1955, 159: 845.

THE AUTHORS review the operative risk in patients with coronary artery disease. Their study is based upon experience with 5,778 surgical patients at the New England Center Hospital

The patients were divided into three groups: (1) those with known coronary artery disease and a remote or recent infarct, this group consisting of 517 patients; (2) a group of 1,107 patients with no history of coronary artery disease but with unequivocal abnormal electrocardiographic changes; (3) a group of 4,154 patients with no clinical evidence of heart disease and with normal electrocardiographic tracings. The patients in groups 1 and 2 were mainly over 60 years of age, while the majority of those in group 3 were under 60 years of age.

The operations were divided into major and minor procedures and in each of the three groups about 60 per cent were major and 40 per cent were minor operations.

When a correction is made for age, and the total overall mortality is studied, it is found that the total death rate after surgery in a group of patients with coronary artery disease is not statistically higher than the expected rate—based on experience with the group of patients without heart disease.

There were 15 postoperative deaths from all causes in the series of 517 patients with coronary artery disease; of these, 6 were cardiac deaths. In this group of 517 patients, 11 were operated upon, of necessity, during the acute phase of the coronary heart disease, and 2 of these patients died of myocardial infarction.

There were only 4 cardiac deaths among the 506 patients with chronic coronary heart disease, or an

incidence of 0.8 per cent. This mortality rate was approximately the same as that occurring in the group with abnormal electrocardiograms but with no history of cardiac pain. There were 7 deaths in the latter group, 4 from myocardial infarction and 3 from acute pulmonary edema. Acute pulmonary edema was considered a cardiac complication when no other cause could be recognized. The incidence of death from pulmonary embolism was not significantly influenced by the presence of heart disease.

An analysis of the effect of operative time upon the deaths from all causes in patients with coronary artery disease showed that the duration of anesthesia and surgery did not affect the postoperative mortality rate.

It appears that if a patient has survived his acute coronary attack and is in the chronic state an operation may be carried out which would be otherwise justifiable, with a minimum of added risk.

—*John H. Davis, M.D.*

Infection Acquired in the Hospital. LEONARD COLEBROOK. *Lancet*, Lond., 1955, 2: 885.

THE AUTHOR surveys the problem of hospital infections during the past 100 years. He suggests that in the building of new hospitals, mistakes made in the past, which contributed to the spread of infections in hospitals, not be repeated. He states further that the dilemma of hospital infection has been complicated rather than solved by chemotherapy and antibiotics and he believes that hospital infection may become more important in the future.

In maternity hospitals the menace of puerperal fever diminished gradually with a better understanding of the part played by streptococci from the throat and nose, with the adoption of asepsis and antisepsis, and the development of better obstetric techniques. Finally there was a spectacular fall in the death rate following introduction of the sulfonamides. Although the risk of epidemic sepsis is much less than it was 30 years ago, it still must be reckoned with. The threat of puerperal infection must be borne in mind in the planning of future maternity hospitals, and continued vigilance is still required on the part of all those engaged in obstetric work.

It is difficult to assess the amount of cross-infection in the nurseries of maternity hospitals, but it is well known that within the past 20 years neonatal staphylococcal infections have been a cause of grave concern in many maternity hospitals.

In other institutions to which infants are admitted, such high mortality rates have been reported that there can be little doubt that transmission of infection was a major factor. On children's wards in general hospitals it is reported that cross-infection developed in about 7 per cent of the children. Infections of the upper respiratory tract ranked first and those of the gastrointestinal tract, second.

The incidence of postoperative sepsis is trifling today compared with the immense amount of clean surgery that is successfully performed without such misfortune. Because of the antibiotics, such infections as do occur seldom have very serious consequences. In the author's experience, in British hospitals there is much more infection transmitted in the operating rooms and wards than should be accepted.

It has been established by bacteriologic detective work that many infections both in and out of hospitals originate from organisms expelled from the throat and nose of patients with some infective condition of the upper respiratory tract. The organisms, expelled by coughing, sneezing, or talking, can survive in dust for many weeks, and they may be carried as minute droplets for long distances.

Another difficult problem is the increasing number of patients, nurses, and doctors who harbor staphylococci resistant to antibiotics in their noses, without manifest signs of infection. These nose carriers are important with regard to staphylococcal cross-infection of wounds.

Every time a wound dressing is disturbed in an open ward, thousands of particles are scattered into the surrounding air, and often these particles carry pathogenic bacteria which may be transported by air currents to colonize the wound of another patient. Covering an open wound by the conventional sterile dressing may afford less protection than is supposed. If the dressing becomes soaked with exudate, many pathogens from the air or bedding or hands can grow through the serous fluid and colonize the wound beneath. Blankets and bedding often harbor pathogens, and shaking them can disseminate organisms.

The following suggestions to diminish the chance of spread of infection in a hospital community are given:

1. Diminish the amount of contaminated dust in hospital wards, and prevent its dispersal by air currents by the oiling of bedclothes and floors, frequent cleanings, etc.

2. Improve methods of removing dust from wards by using vacuum cleaners and built-in suction systems. Soiled bed linen should be placed immediately in closed containers and, if possible, removed by means of a chute for sorting well away from the hospital, and by some one other than a nurse.

3. Ventilate operating rooms, dressings rooms, and perhaps even open wards, by means of filtered warm air introduced at the ceiling level and stale air exhausted at the floor level. Contaminated (unsterilized) blankets and bedclothes should not be taken into the operating room, and dressings should be removed in an adjacent room.

4. Make more provision for the isolation of infected, and infective patients in cubicles which can be readily closed and sealed for fumigation.

5. Provide a central sterile supply department.

6. Appoint an infection control officer. A systematic check on all infections acquired in hospitals is important.

—*Robert Paradny, M.D.*

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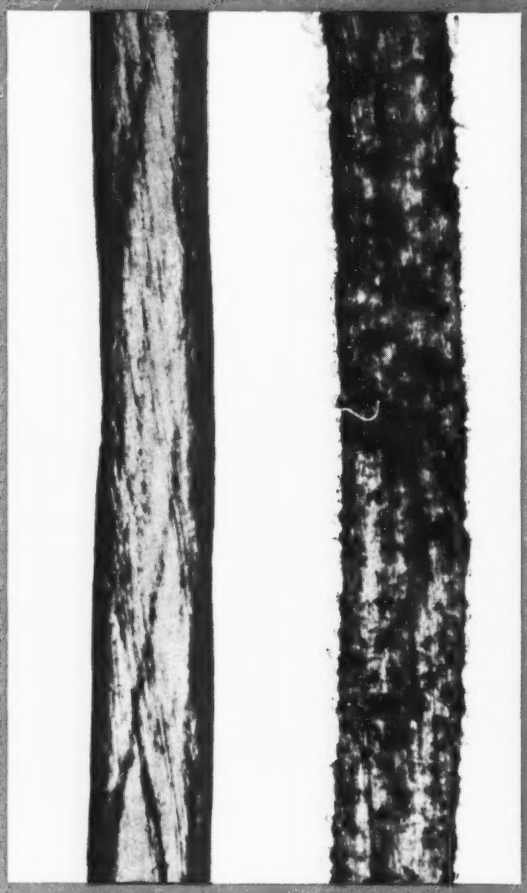
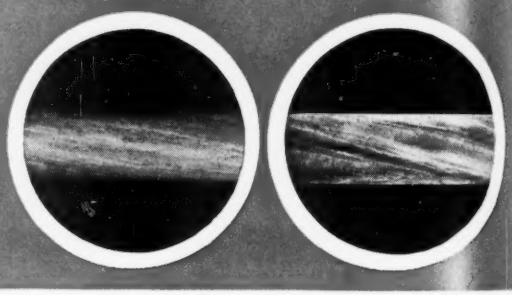


Photomicrography shows why D & G gut is stronger— more flexible



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Photomicrograph* detects surface fraying and roughness. This gut was ground to size. It appears uniform to the naked eye, but the powerful camera lens shows imperfections which may cause weakness when a knot is tied.

*Medium chromic gut, 5-0; light field method; 106 x

D & G gut

Photomicrograph** shows firm, even cohesion of plies—twisted into strands before chromicizing —for greater flexibility. Natural collagen firmly bonds the plies —holds the twist. This results in greater knot strength under stress.

Another leading gut

Photomicrograph** detects separate plies in this gut. Here each ply was chromicized before twisting into suture strand. This process limits natural bonding —lowers flexibility and tensile strength — encourages fraying.

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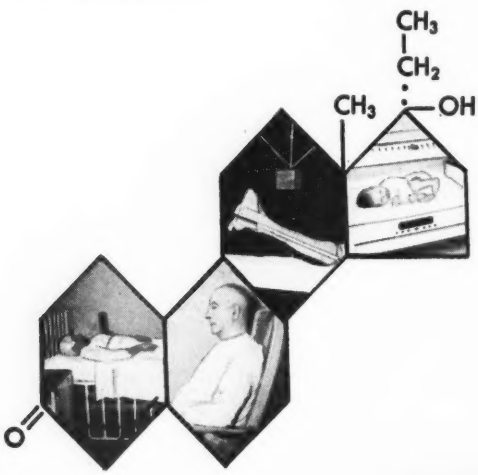

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Annual Subscription: United States and Canada, $15.00; Other Countries, $17.00. Published Monthly. Entered as second-class matter January 14, 1931, at the postoffice at Chicago, Ill., under the Act of Congress, March 3, 1879.

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(1) Jennings, E. R., and Cowley, R. A.: Surgery 37:206, 1955. (2) Lam, C. R., in Lam, C. R.: Cardiovascular Surgery, Philadelphia, W. B. Saunders Company, 1955, p. 355.

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JUNE 1956

VOLUME 102
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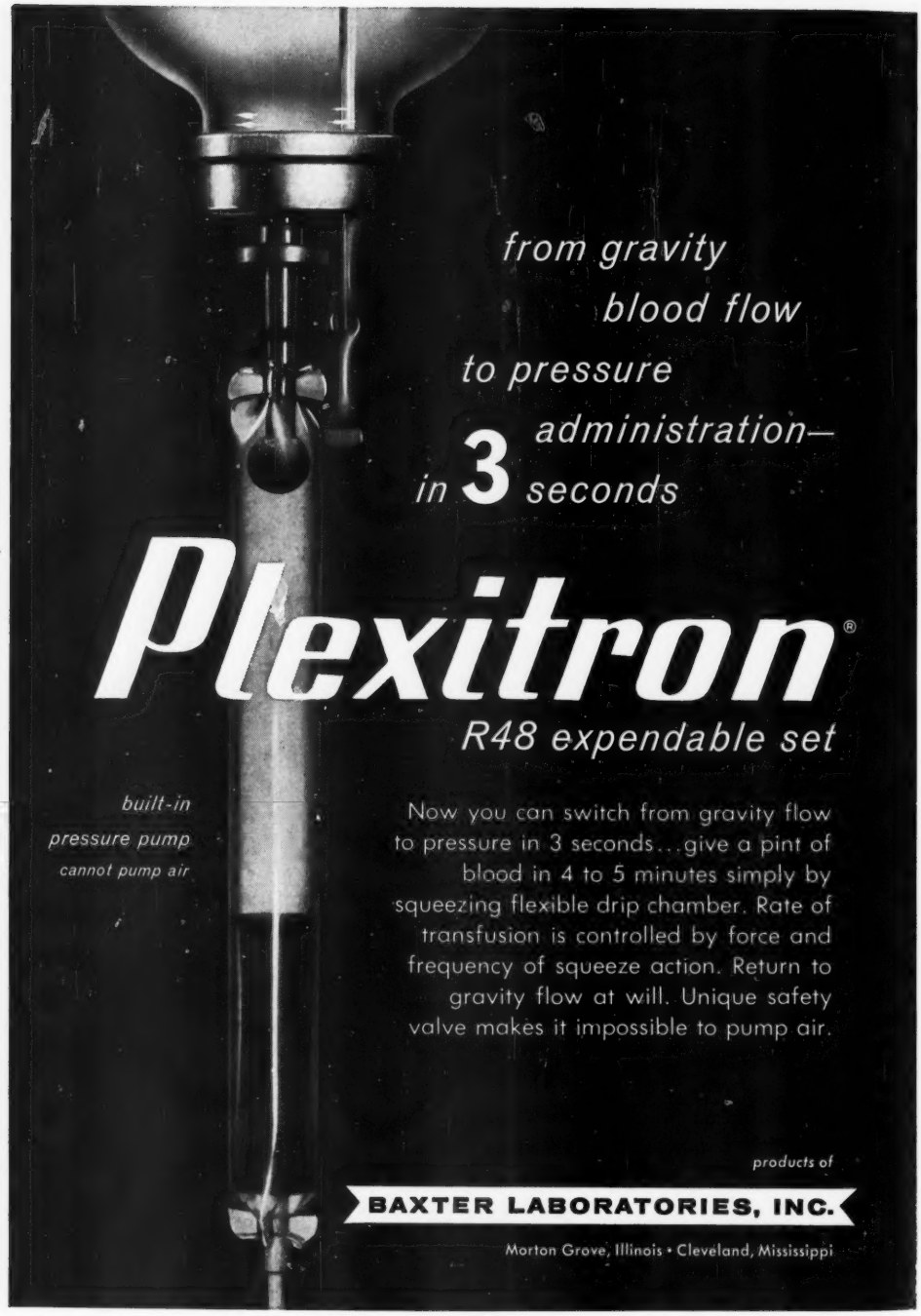
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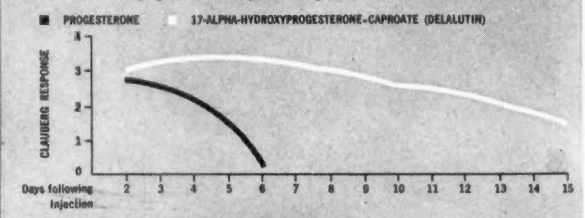

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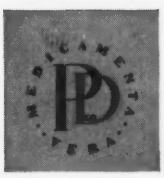

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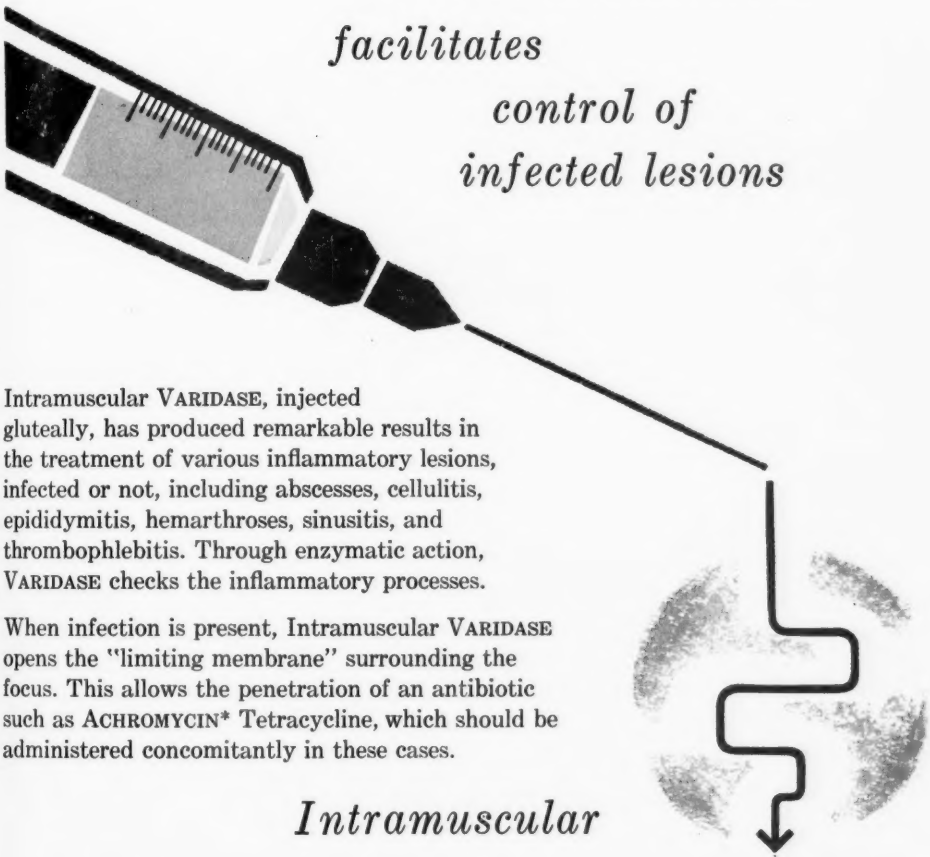

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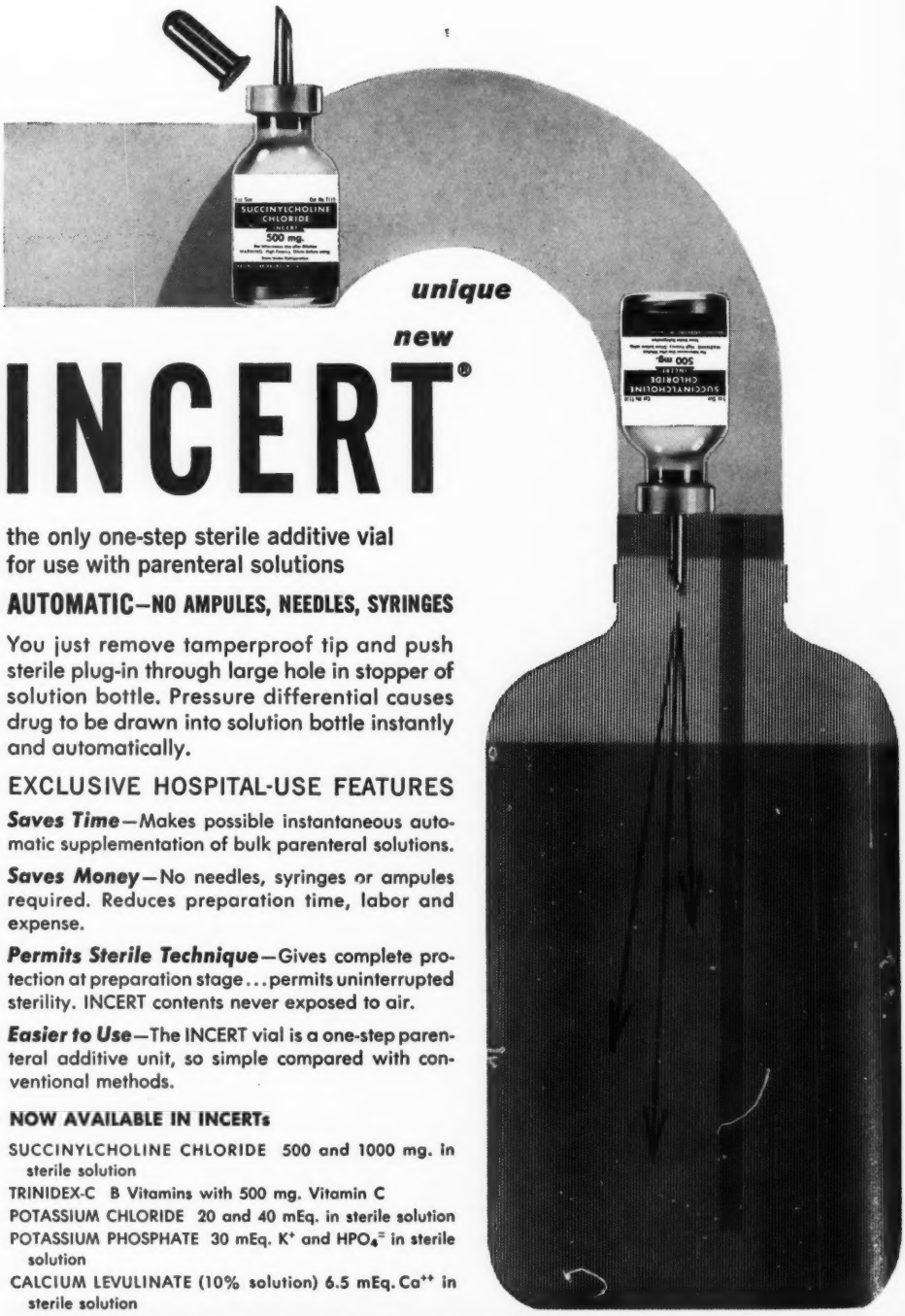

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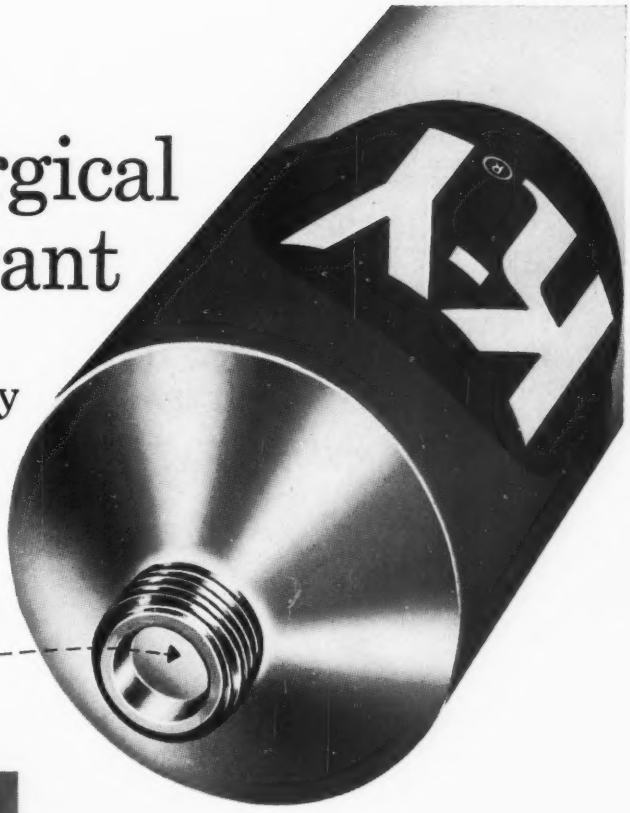

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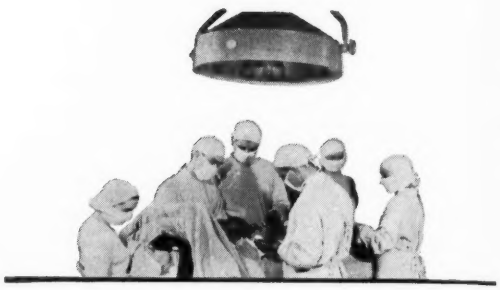

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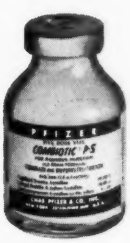

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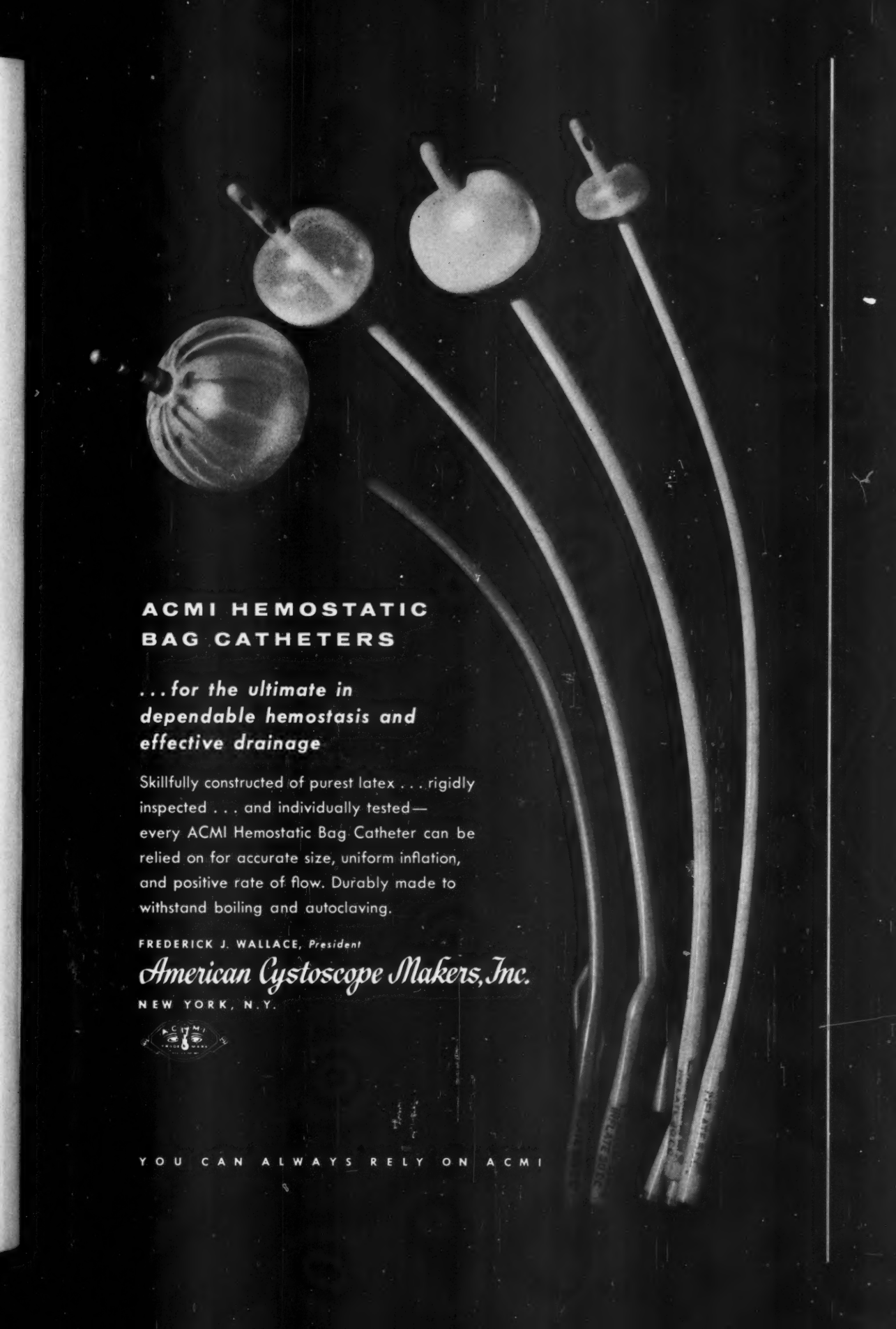

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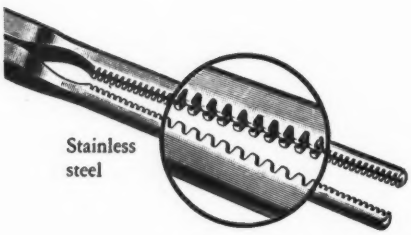

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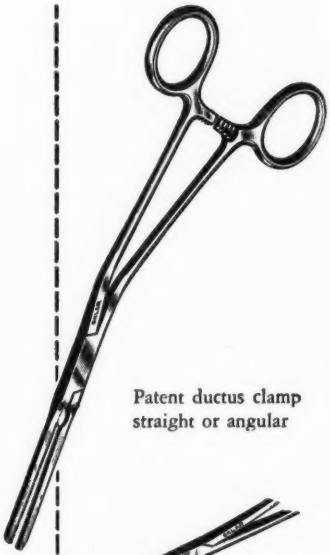

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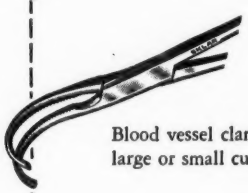
Satinsky
vena cava clamp



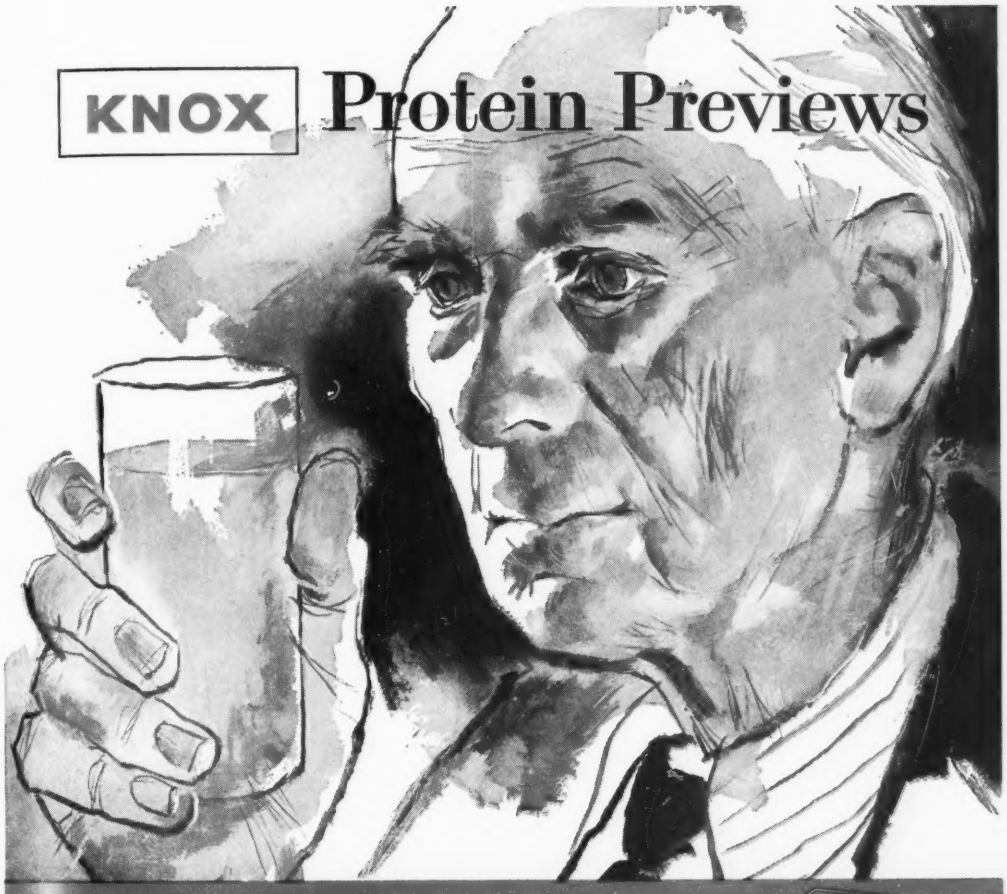
Blood vessel clamp
large or small curve

Coarctation clamp
straight or angular

Bronchus clamp, angular

Bulldog clamp
2", 2½" 3", 3½"

KNOX Protein Previews



Maintaining Lean Body Mass in the Edentulous Geriatric Patient

Extensive loss of body protein can occur in either the spare or obese geriatric patient. But whatever the patient's somatotype, a decrease in lean body mass is usually the result of inadequate protein intake due to poor dentition, slowed-down digestion and quite frequently, unappetizing main dishes.

Knox Gelatine is an excellent non-residue protein which is easy to chew and readily digested and assimilated. As a vehicle for many foods, Knox Gelatine brightens bland diets, giving a new interest to jaded appetites. As a concentrated protein drink, Knox Gelatine supplies seven out of eight essential amino acids and a majority of the other amino acids composing protein.

Specific suggestions on how to use Knox Gelatine in different types of geriatric diets are described in the booklets listed in the coupon below.

Chas. B. Knox Gelatine Company, Inc.
Professional Service Department SG-3
Johnstown, N. Y.

Indicate number of special diet booklets desired for your patients opposite title:

GERIATRIC_____ REDUCING_____

DIABETIC_____ CONVALESCENT_____

YOUR NAME AND ADDRESS

Erythrocin in the treatment of pharyngitis*

9/12/55

DISCHARGE SUMMARY

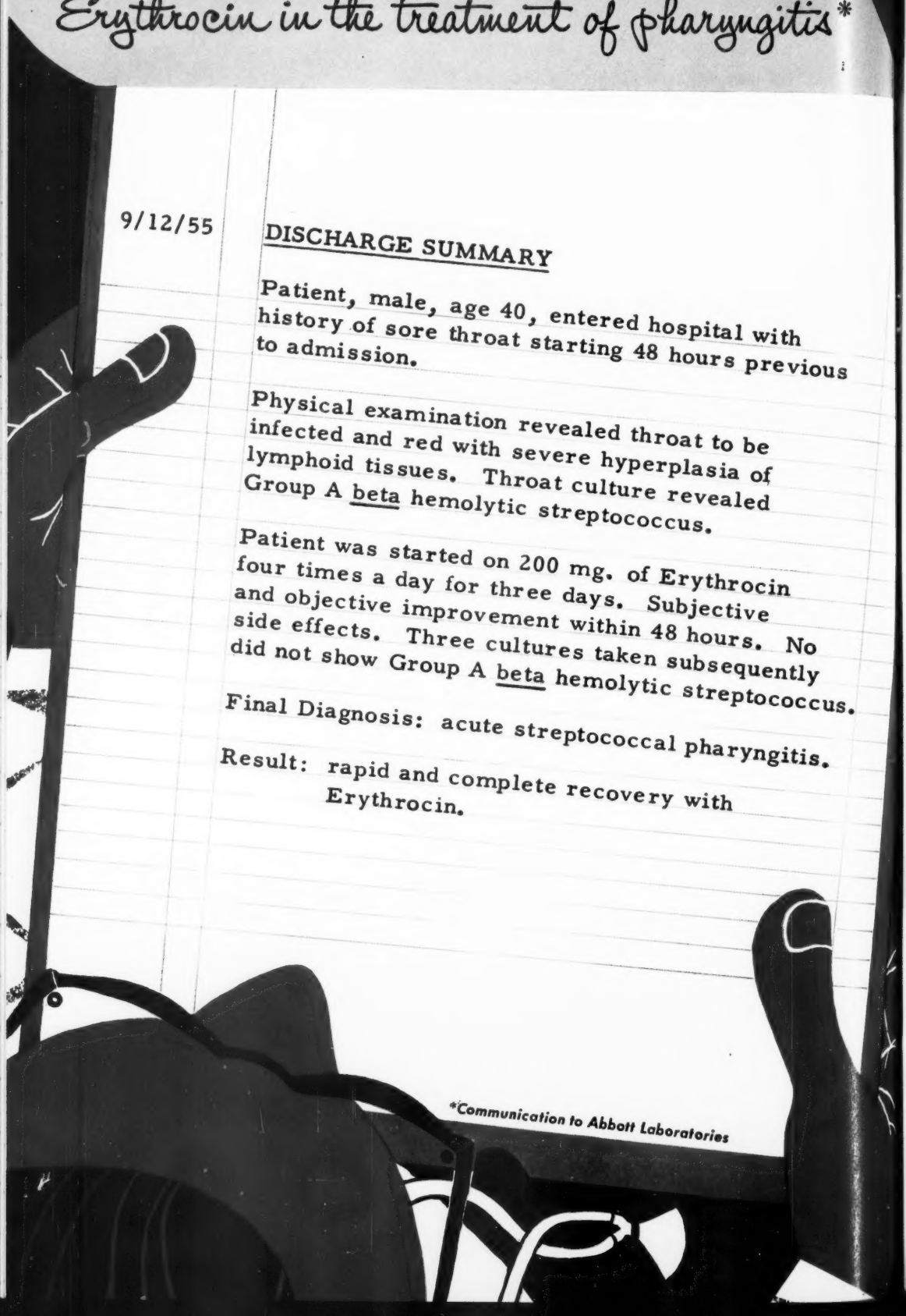
Patient, male, age 40, entered hospital with history of sore throat starting 48 hours previous to admission.

Physical examination revealed throat to be infected and red with severe hyperplasia of lymphoid tissues. Throat culture revealed Group A beta hemolytic streptococcus.

Patient was started on 200 mg. of Erythrocin four times a day for three days. Subjective and objective improvement within 48 hours. No side effects. Three cultures taken subsequently did not show Group A beta hemolytic streptococcus.

Final Diagnosis: acute streptococcal pharyngitis.

Result: rapid and complete recovery with Erythrocin.



*Communication to Abbott Laboratories

specific against coccic infections

Specific—because you can actually pinpoint the therapy for coccic infections. That's because you know most bacterial respiratory infections are caused by staph-, strep- and pneumococci. And these are the very organisms most sensitive to ERYTHROCIN—even when they resist penicillin and other antibiotics.

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Erythrocin®

(Erythromycin Stearate, Abbott)
STEARATE

with little risk of side effects

Low toxicity—because ERYTHROCIN (in contrast to many other antibiotics) rarely alters intestinal flora. Thus, patients seldom get gastroenteral side effects. Or loss of vitamin synthesis in the intestine. No allergic reactions, either. *Filmtab* ERYTHROCIN Stearate (100 and 250 mg.), bottles of 25 and 100. Abbott

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(Erythromycin Stearate, Abbott)
STEARATE

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DOXINATE*

A Better Answer to the Problem of Constipation

Permits normal bowel habits—". . . [Doxinate] certainly seems to be a better answer to this problem [constipation] than do any of the therapeutic agents previously available."[1]

Effective—"In all patients, the administration of dioctyl sodium sulfosuccinate proved to be an effective fecal softener."[2]

Gradual action—"The softening effect of . . . [Doxinate] on the stool was apparent on the average in 48 hours."[1]

Nontoxic—"dioctyl sodium sulfosuccinate has wide usefulness in . . . constipation . . . without the danger of toxicity or decreasing effectiveness . . ."[3]

Doxinate acts **only** on the bowel **content.**

Doxinate increases the wetting ability of intestinal fluids as much as 25 times. The resulting homogenization of fecal material makes the stool soft and yet well-formed for easy evacuation.

Doxinate is completely free of irritant laxative or "bulk" effect—nor is flatulence or oily leakage ever a problem.

Doxinate does not cause bowel movement. Instead, it **permits** normal bowel habits.

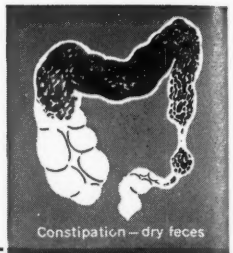
dosage:

Adults: one green 60 mg. capsule daily or one to three orange 20 mg. capsules daily.

Infants and children: 1 cc. or 2 cc. once daily in formula, milk or orange juice.

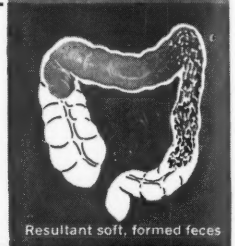
1. Spiesman, M. C., and Malow, L.: Journal-Lancet (June) 1956.
2. Antos, R. J.: Southwestern Med. *37*:236 (April) 1956.
3. Wilson, J. L., and Dickinson, D. G.: J.A.M.A. *158*:261 (May 28) 1955.

Permits normal bowel habits



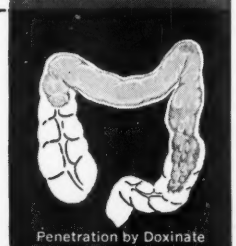
Constipation—dry feces

Effective



Resultant soft, formed feces

Gradual action



Penetration by Doxinate

Nontoxic

DOXINATE*

The original dioctyl sodium sulfosuccinate for constipation

LLOYD
Brothers, Inc.
Cincinnati 3, Ohio
*Patent Pending

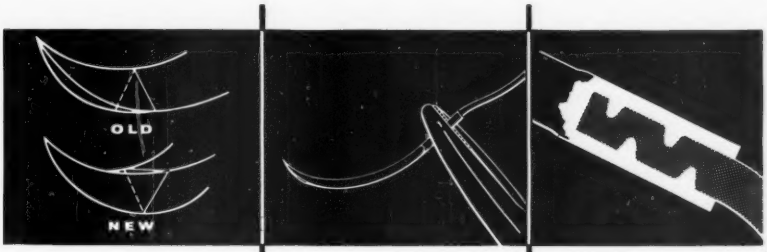
introducing the

Ohio Chemical

REVERSE CUTTING EDGE... SHORT SHANK NEEDLES

higher strength . . . improved cutting efficiency . . . extra protection against suture "pull-out"

Ohio's new reverse cutting edge needle with the short shank design combines greater strength and maximum ease of use with excellent "pull-out" protection. The three-eighths circle needles make greater tissue penetration possible through added length in front of the needle holder. Triangular design throughout entire length provides added strength and prevents twisting in holder. Available for all sizes of nylon, silk and cotton sutures. Feature for feature, these needles are among the finest on the market!



Reverse cutting edge adds 20% more strength. Cutting is made easier, with less tissue resistance or tendency for needle to cut out of tissue.

Short shank needle does not extend out from under the needle holder, thus greatly reducing possibility of bending or breaking.

Staggered nibs or teeth are gripped into the suture under pressure, providing excellent protection against suture "pull-out."

Compare for yourself . . . send for free sample.

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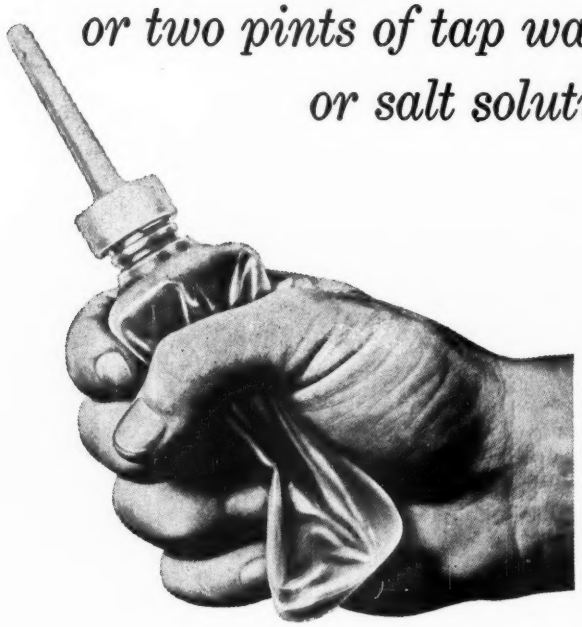
more effective than one
or two pints of tap water
or salt solution



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Salicylate

(*brand of carbazochrome salicylate*)

in the control of bleeding

Films in color, demonstrating the uses of Adrenosem Salicylate* in surgery, are now available for showing to hospitals, medical societies and group meetings. Write to Film Division, S. E. Massengill Co., Bristol, Tennessee.

Send for comprehensive illustrated brochure describing the action and uses of this unique systemic hemostat.

INDICATED *preoperatively and postoperatively to control bleeding associated with:*

Tonsillectomy, adenoidectomy and nasopharynx surgery
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Dental surgery
Chest surgery and chronic pulmonary bleeding
Uterine bleeding and postpartum hemorrhage
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Supplied in ampuls, oral tablets and as a syrup.

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Latest clinical report on **Adrenosem®** *Salicylate*

(brand of carbazochrome salicylate)

The Use of the Systemic Hemostat Carbazochrome Salicylate

J. C. Bacala, M.D.

(Abstracted from the Western Journal of Surgery, Obstetrics, and Gynecology, 64:88 (1956)

The author emphasizes the need for dependable chemical control of bleeding and oozing, and reviews the methods that have been tried to attain hemostasis, including the use of vitamin K and bioflavonoids.

He gives the history of carbazochrome salicylate and describes the clinical work completed to demonstrate its effectiveness. It appears to be specific for conditions characterized by increased capillary permeability. It has no effect on large blood vessels; it does not alter blood components; it does not affect blood pressure or cardiac rate. It has neither vasoconstrictor or vasodilator action. The drug has no known contraindications.

He reviews 1051 cases from the files of St. Anthony Hospital, Louisville, Kentucky, of which 330 were treated with Adrenosem Salicylate. 317 were surgical cases and 13 obstetric-gynecological conditions. The treatment was given for symptomatic relief, and as a clinical recourse for patient safety.

In 1015 tonsillectomy patients the following results were noted: There was bleeding in 85 (19.8%) of 429 patients who received no medication. Patients who received a compound of oxalic and malonic acids numbered 115. Of these 16 (14%), developed bleeding. Of 248 patients receiving vitamin K preparations, 47 (19%) had postoperative hemorrhage. 233 patients received Adrenosem Salicylate. Of this group, only 16 (7%) had bleeding.

In other surgical conditions, Adrenosem was used successfully in gastrointestinal bleeding, cataract extraction, incisional seepage, and transurethral prostatectomy. It was also effective in 12 cases of epistaxis.

In the field of obstetrics and gynecology, Adrenosem controlled bleeding in menometrorrhagia, hymeneal laceration, cervical ooze, antepartum and postpartum bleeding, threatened abortion, and in two cases of surgery during pregnancy.

The author points out that in pregnancy, seepage bleeding occurs more because of capillary permeability, and in spite of increased coagulability. Here, Adrenosem becomes specific for strengthening capillary resistance.

Many of the observations in this study, however, involved bleeding incident to trauma of incision, retraction, dissection, tearing and stretching. In these conditions, he reasons that Adrenosem causes hemostasis by its effect on the capillary intercellular cement substance so that the cells draw closer together, and the ends of the capillaries constrict, causing a "self-clamping" mechanism.

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A MARKED ADVANCE *in* *Obstetrical Sedation*

Injection PHENERGAN Hydrochloride meets advanced aims in sedation for labor and childbirth. In a study of 300 obstetrical patients given PHENERGAN with meperidine, Carroll and Hudson[1] report:

- Predictable sedation
- Decreased apprehension
- Easier and shorter labor
- Potentiated hypnotic and analgesic action of meperidine
- Lowered incidence of nausea and vomiting
- Reduced requirement of anesthetic for delivery
- Absence of untoward reactions on mother and infant

Supplied: Injection PHENERGAN Hydrochloride, vials of 10 cc.; each cc. contains 25 mg. of PHENERGAN Hydrochloride in Water for Injection U.S.P., suitable for intramuscular or intravenous use. Also available: PHENERGAN Hydrochloride Tablets of 12.5 or 25 mg., bottles of 100. PHENERGAN Hydrochloride Syrup, bottles of 1 pint; each 5-cc.teaspoonful contains 6.25 mg. of the salt.

1. Carroll, J.J., and Hudson, P.W.: Canad. Anaes. Soc. J. 2:340 (Oct.) 1955.

NEW *Injection* PHENERGAN®

HYDROCHLORIDE

Promethazine Hydrochloride

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It's not a distress call... not yet... but it could be— For effective appetite suppression in obesity...

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METHAMPHETAMINE AND PHENOBARBITAL

TABLETS AND EXTENTABS®

The "distress call" in obesity often comes from the emotional "misfit," unable to control mood or appetite. Ambar allays this hunger sensation by *gently* lifting the depressed mood, and *subtly* reducing the emotional distresses so often responsible for the urge to overeat. Ambar brings the obese patient's appetite "down to normal"...

...without peaks of stimulation
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...without significant cardiovascular effects
...without postmedication "jitters"

AMBAR™ TABLETS

Methamphetamine Hydrochloride . . 3.33 mg.
Phenobarbital (1/3 gr.) . . . . . 21.6 mg.

Average duration of therapeutic effects 4 hours

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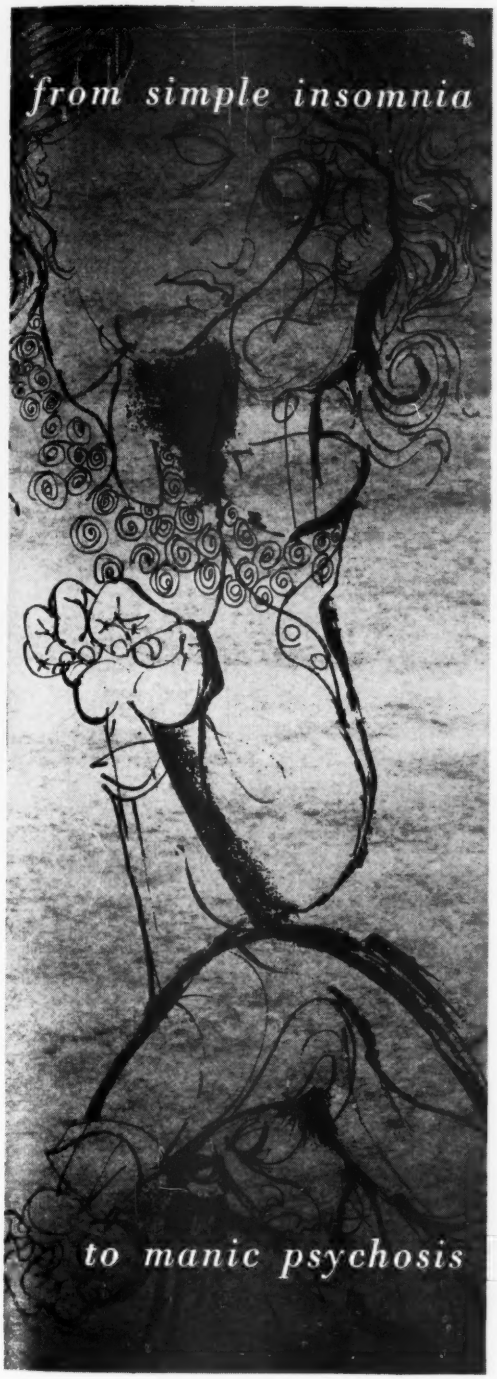

whenever a patient

needs prompt,

effective sedation . . .

short-acting

Nembutal®

(Pentobarbital, Abbott)

You can achieve any degree of sedation using short-acting Nembutal—usually with only about one-half the dosage of many other barbiturates. This means:

. . . less drug to be inactivated,

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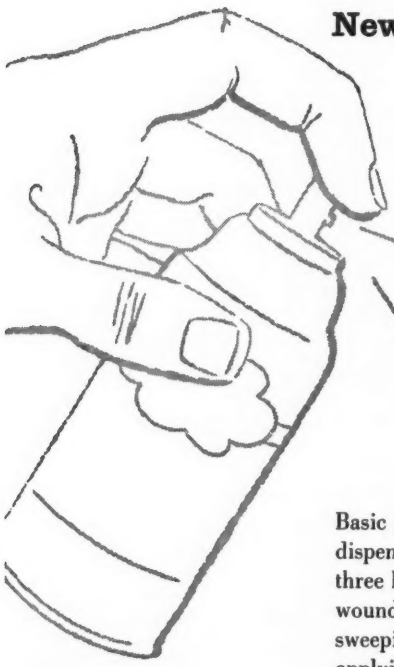


New, more efficient wound dressing procedures are made possible with

AEROPLAST®

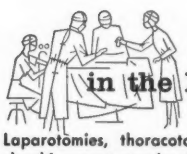
brand of Vibesate

plastic spray-on dressing[2,3,4]

Basic procedure in applying Aeroplast is simple. With the dispenser held about ten inches away from the lesion, two or three light coats are sprayed directly onto the aseptic dry wound and adjacent skin area. Each coat is sprayed on in one sweeping stroke, then allowed to dry thirty seconds before applying the next.

The transparent film dressing which results **excludes bacteria, is non-macerating, non-sensitizing, and does not adhere to raw wound surfaces,** thus **encourages a clean, primarily healed wound.**[4] Aeroplast adapts to any body contour, permitting satisfactory dressing of awkwardly situated wounds without uncomfortable bulk. This method of dressing allows the physician to evaluate healing progress at will without removing the dressing.

Cost of Aeroplast dressing as applied is about ½ cent per square inch. For example, cost of dressing one 10 inch incision is approximately 20 cents. In most wounds, the initial dressing is sufficient until time to remove sutures.[2,3] Aeroplast is STERILE.



in the hospital

Laparotomies, thoracotomies, herniorrhaphies, mastectomies, ileostomies, colostomies, pilonidal cysts, skin graft donor and recipient sites, severe excoriation . . . all offer opportunities for use of Aeroplast as the primary and definitive dressing.

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For minor burns, abrasions, lacerations, superficial scalp wounds, or to dress almost any hard-to-bandage site, Aeroplast has the advantage of being washable, inexpensive, and not cumbersome.

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Whether the injury is from trauma, burn, excoriation, or minor surgery—Aeroplast protects from dirt and bacteria, is washable and flexible, and may help shorten off-the-job time. Patients appreciate its convenience.

1. Vibesate (Aeroplast), New and Nonofficial Remedies, 1955, p. 541.
2. Choy, D.S.J.: A.M.A. Arch. Surg. 68:33 (Jan.) 1954.
3. Rigler, S. P., and Adams, W. E.: Surgery 36:792 (Oct.) 1954.
4. Wexler, D. J., Bromberg, F., Rakieten, M. L., and Ryan, B. J.: Am. J. Surg. In Press.

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BETTER

results are obtained with STERANE[1]—3 to 5 times more active than hydrocortisone or cortisone.

BREATHING

capacity is greatly enhanced. "Relief of symptoms is more complete and maintained for longer periods with relatively small doses."[2]

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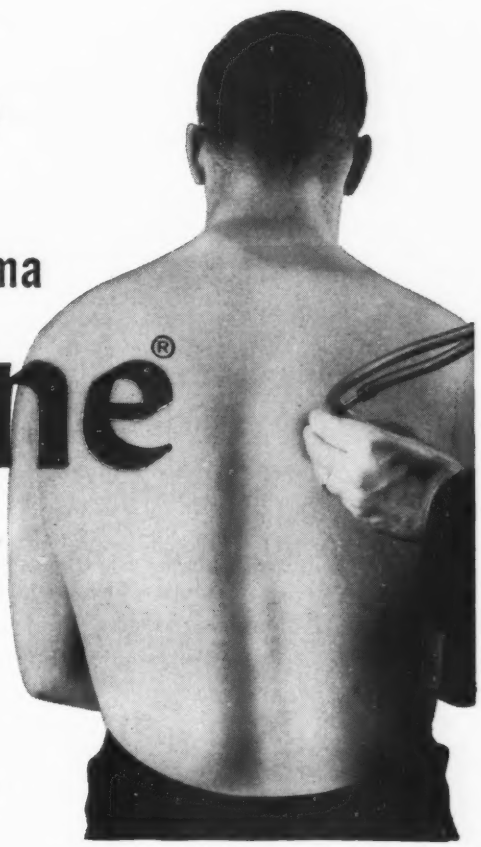

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Sterane®

brand of prednisolone

Supplied: White, 5 mg. oral tablets, bottles of 20 and 100. Pink, 1 mg. oral tablets, bottles of 100. Both deep-scored.

1. Johnston, T. G., and Cazort, A. G.: J. Allergy 27:90, 1956. 2. Schwartz, E.: New York J. Med. 56:570, 1956. 3. Schiller, I. W., et al.: J. Allergy 27:96, 1956.

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weeks?

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Healing of fractures is often delayed because impairment of osteoblastic activity due to declining sex hormone function causes the bone matrix to atrophy.

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*Reifenstein, E. C., Jr., in Harrison, T. R.: Principles of Internal Medicine, ed. 2, New York, The Blakiston Company, Inc., 1954, chap. 98, pp. 702, 703.

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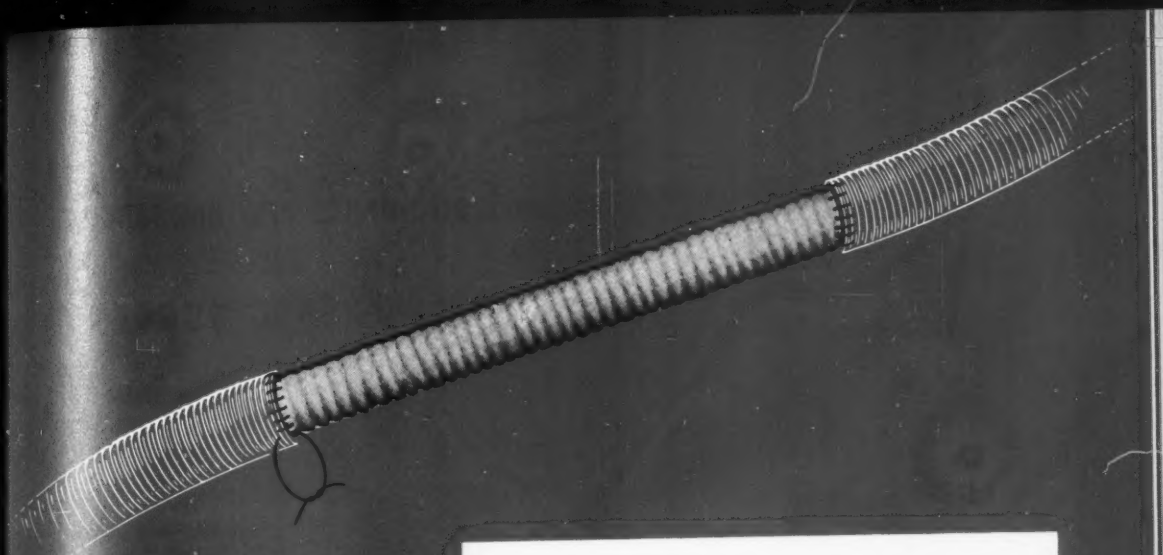

NEW ARTERY GRAFT

of Specially Treated Braided Nylon

DEVELOPED BY

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James S. Tapp, Ph.D. — Research Department
The Chemstrand Corporation

Prefabricated A-G™ Tube Solves Problem for Surgeons

Now surgeons everywhere can have immediately available an arterial graft of the size and length desired. The new Edwards-Tapp A-G Tube provides a permanent implant that permits immediate circulation and restoration of artery continuity.

Overcomes oozing — The Nylon strands are chemically welded together and silicon coated to prevent hemorrhage.

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Reference: Edwards, W. Sterling and Tapp, James S.: Chemically Treated Nylon Tubes as Arterial Grafts, Surgery 38: 61-70, 89-91 (July) 1955.
Edwards, W. Sterling and Tapp, James S.: Peripheral Artery Replacement with Chemically Treated Nylon Tubes, Surg., Gynec. & Obst. 102: 443-449 (April) 1956.

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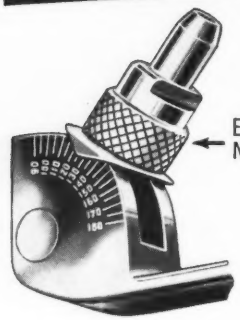

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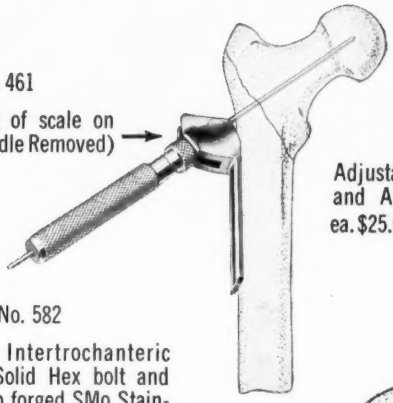

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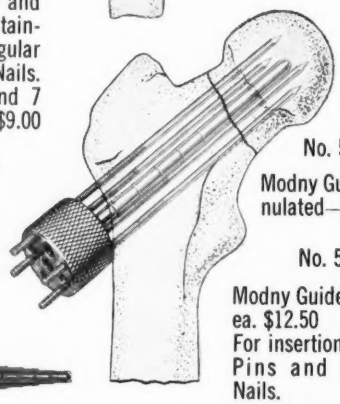

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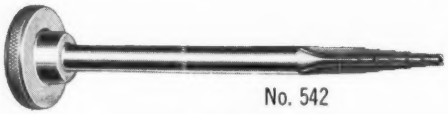
For insertion of Moore Pins and Multiple Nails.



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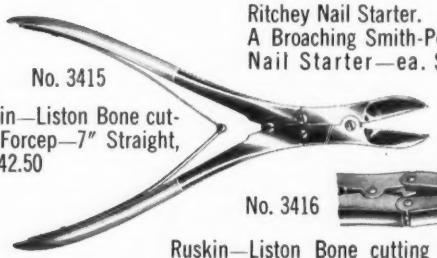
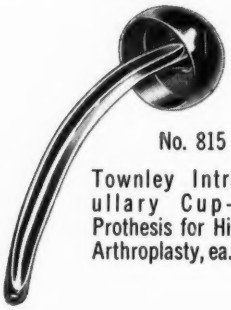
No. 3415

Ruskin—Liston Bone cutting Forcep—7″ Straight, ea. $42.50



No. 3416

Ruskin—Liston Bone cutting Forcep—7″ Angular on flat, ea. $45.00



No. 815

Townley Intramedullary Cup-Stem Prothesis for Hip Joint Arthroplasty, ea. $75.00

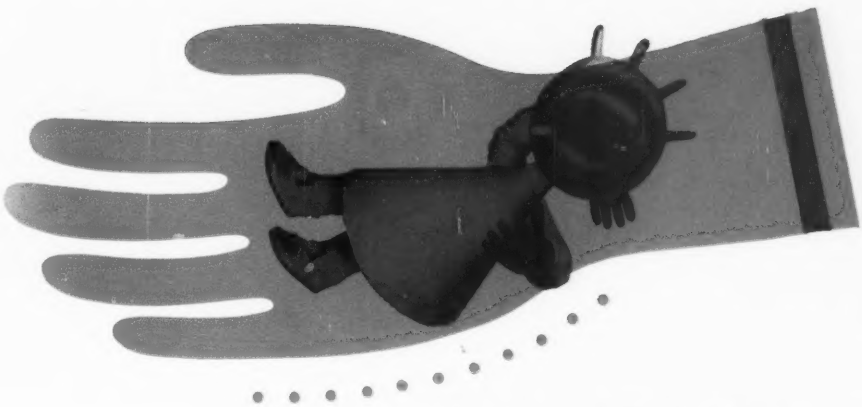
Zimmer

Look for the trademark

ZIMMER MANUFACTURING CO. • WARSAW, INDIANA

In Canada Available through selected surgical supply dealers or through our Agents, Fisher & Burpe, Ltd.

curved for greater comfort



the curved finger story

WILSON® surgeons' gloves

In ordinary, straight-fingered surgeons' gloves, the glove may work *against* the hand. For every movement requiring flexion, greater than normal effort is needed. Tension and finger fatigue result.

To overcome this problem, WILSON research and production experts developed the WILSON *curved finger* glove—a glove whose shape conforms to the natural, curved contour of the relaxed hand. The result: operating room personnel using WILSON Surgeons' Gloves report greater ease and freedom of movement than ever before, and a striking reduction in hand and finger fatigue.

COLOR-BANDED FOR QUICK SORTING

THE WILSON RUBBER COMPANY B-D
A DIVISION OF BECTON, DICKINSON AND COMPANY • CANTON, OHIO

B-D AND WILSON, T.M. REG. U.S. PAT. OFF. 34655

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THERACEBRIN

(PAN-VITAMINS, THERAPEUTIC, LILLY)

the most potent multiple vitamin

When a really vigorous therapeutic vitamin regimen is indicated, 'Theracebrin' provides large doses of the important fat and water-soluble vitamins. Especially valuable following major surgery and burns and in infectious hepatitis, malnutrition, and chronic debilitating diseases. Eli Lilly and Company, Indianapolis 6, Indiana, U. S. A.

A DISTINGUISHED MEMBER OF THE *Lilly* FAMILY OF VITAMINS

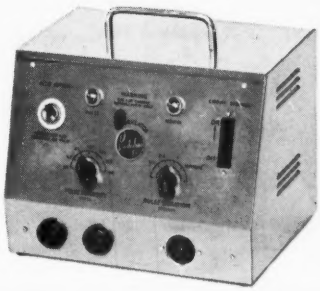
80TH ANNIVERSARY 1876 · 1956 / ELI LILLY AND COMPANY

NO OPERATING ROOM IS COMPLETE WITHOUT THESE 2 ESSENTIAL OPERATING ROOM EMERGENCY DEVICES

Reliable estimates place the number of deaths in the operating room from cardiac arrest at one in every 7,500 anesthesias![1] Deaths due to ventricular fibrillation account for approximately 10% of this total.[2] We at the Birtcher Corporation have engineered and built two electronic devices which we hope can substantially reduce operating room mortality... the Birtcher Defibrillator and the Birtcher Heartpacer.

1. Cross, Frederick S., M.D.: Clinical Medicine, 1121-1125, November, 1955.
2. Hosler, Robert M., M.D., Cleveland, Ohio: A Manual on Cardiac Resuscitation, Charles C. Thomas—publisher, 1954.

DEFIBRILLATOR



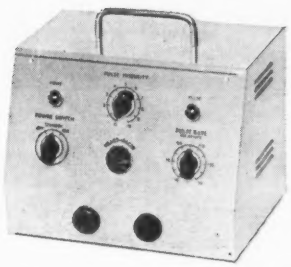
THE BIRTCHER DEFIBRILLATOR

Designed to stop ventricular fibrillation through the application directly to the ventricles of the heart automatic or manually timed and strength controlled electrical shock. For use prior to restoration of coordinated heartbeat through cardiac massage by the Surgeon, and its later maintenance by the use of a Cardiac Heartpacer.

HEARTPACER T.M.

THE BIRTCHER HEARTPACER

For external application in cardiac and circulatory arrest, to re-establish through automatic electric surges, properly paced ventricular rhythm, for hours or days as may be required. Indicated for resuscitation in those emergencies which often arise during reflex vagal stimulation, diagnostic and therapeutic procedures and anesthesias, treatment with cardioactive drugs, Stokes-Adams disease and cerebral ischemia.



A collection of reprints from Medical Journals on the subject of cardiac arrest and resuscitation, and descriptives on these two machines will be sent on request.

THE BIRTCHER CORPORATION

the world's largest volume producer of electro-medical-surgical devices

THE BIRTCHER CORPORATION Dept. SBO-656
4371 VALLEY BLVD., LOS ANGELES 32, CALIFORNIA

Please send me Cardiac Resuscitation reprints and descriptives on Defibrillator and Heartpacer.

Name_____

Address_____

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prescribe *a full measure of comfort for anorectal patients with*

DESITIN®

hemorrhoidal SUPPOSITORIES with cod liver oil

In boxes of 12 foil-wrapped suppositories

samples yours for the asking

DESITIN SUPPOSITORIES quickly soothe, protect, lubricate the distressed anorectal mucosa to provide.....

- **gratifying comfort in hemorrhoids** (non-surgical)
- **rapid, sustained relief of pain, itching and spasm without styptics, local anesthetics or narcotics, therefore do not mask serious rectal disease**
- **reduced engorgement, bleeding • safe, conservative**

DESITIN CHEMICAL COMPANY • Providence, R. I.

Only Meat . . . is Meat

Suppose we suddenly found ourselves in a "Brave New World," in which all the rich protein, the B vitamins (including the important B_{12}), the minerals, and all the other nutrients of a juicy steak or a succulent pork chop could be compressed into a capsule. Suppose we were to take one or two such capsules each day. What would happen?

Would we be just as healthy? Would we be as happy?

There is something about man's wish for meat that cannot be satisfied by chemical or mathematical analyses. The feeling of satisfaction, the downright enjoyment of biting into and chewing, the pleasurable effect of having eaten well . . . all these make meat more than just an impressive list of essential nutrients. Long before man knew anything about the science of nutrition he knew meat was part and parcel of his health and his joy of eating and of living.

Other foods may be fortified and enriched, *but none can ever take the place of meat.*

Only meat is meat.

The nutritional statements made in this advertisement have been reviewed by the Council on Foods and Nutrition of the American Medical Association and found consistent with current authoritative medical opinion.

American Meat Institute
Main Office, Chicago . . . Members Throughout the United States

ACHROMYCIN

Tetracycline *Lederle*

in the treatment of

infections in surgery

The prevention and control of cellulitis, abscess formation, and generalized sepsis has become commonplace technique in surgery since ACHROMYCIN has been available. Leading investigators have documented such findings in the literature.

For example, Albertson and Trout[1] have reported successful results with tetracycline (ACHROMYCIN) in diverticulitis, gangrene of the gall bladder, tubo-ovarian abscess, and retropharyngeal abscess. Prigot and his associates[2] used tetracycline in successfully treating patients with subcutaneous abscesses, cellulitis, carbuncles, infected lacerations, and other conditions.

As a prophylactic and as a therapeutic, ACHROMYCIN has shown its great worth to surgeons, as well as to internists, obstetricians, and physicians in every branch of medicine. This modern antibiotic offers rapid diffusion and penetration, quick development of effective blood levels, prompt control over a wide range of organisms, minimal side effects. There are 21 dosage forms to suit every need, every patient, including

ACHROMYCIN SF

ACHROMYCIN with STRESS FORMULA VITAMINS. Broad-range antibiotic action to fight infection; important vitamins to help speed normal recovery. In *dry-filled, sealed* capsules for rapid and complete absorption, elimination of aftertaste.

[1]Albertson, H.A. and Trout, H. H., Jr.: *Antibiotics Annual* 1954-55, Medical Encyclopedia, Inc., New York, N.Y., 1955, pp. 599-602.

[2]Prigot, A.; Whitaker, J. C.; Shidlovsky, B. A., and Marmell, M.: *ibid*, pp. 603-607.

Lederle

LEDERLE LABORATORIES DIVISION
AMERICAN CYANAMID COMPANY
PEARL RIVER, NEW YORK

*REG. U.S. PAT. OFF.

PHOTO DATA: AERIAL CAMERA WITH K-2 FILTER AT DUSK, F.11, 4/100 SEC., FAST PAN FILM

ACHROMYCIN ACHROMYCIN

The Spectrum of Nutrients in Oatmeal

The important contribution to daily nutritional health made by the broad spectrum of nutrients in the classical Quaker Oats breakfast dish is illustrated by this table. All the nutrients in oatmeal occur naturally.

THE QUAKER OATS BREAKFAST DISH*

NUTRIENTS	OATMEAL	MILK	TOTAL	NUTRIENTS	OATMEAL	MILK	TOTAL
†Protein	4.7 Gm.	3.9 Gm.	8.6 Gm.	†Iron	1.28 mg.	0.12 mg.	1.40 mg.
Carbohydrate	17.7 Gm.	5.7 Gm.	23.4 Gm.	†Calcium	15 mg.	148 mg.	163 mg.
Fat	2.0 Gm.	4.4 Gm.	6.4 Gm.	†Phosphorus	115 mg.	113 mg.	228 mg.
†Thiamine	0.18 mg.	0.05 mg.	0.23 mg.	Potassium	162 mg.	163 mg.	325 mg.
†Niacin	0.26 mg.	0.10 mg.	0.36 mg.	Zinc	1.08 mg.	0.45 mg.	1.53 mg.
†Riboflavin	0.05 mg.	0.19 mg.	0.24 mg.	†Folic acid	11.4 mcg.	0.3 mcg.	11.7 mcg.
†Pyridoxine	0.07 mg.	0.06 mg.	0.13 mg.	Vitamin B_{12}	0.1 mcg.	0.7 mcg.	0.8 mcg.
Pantothenic acid	0.25 mg.	0.41 mg.	0.66 mg.	†Copper	0.31 mg.	0.04 mg.	0.35 mg.
†Vitamin A plus Carotenoids	—	0.08 mg.	0.08 mg.	Manganese	1.45 mg.	0.002 mg.	1.45 mg.
Magnesium	51 mg.	14 mg.	65 mg.	†Calories	111	81	192

*1 oz. oatmeal (dry), 4 oz. whole milk; usually-added sugar not included in evaluation; sources supplied on request.

†Nutrients for which Daily Dietary Allowances are recommended by the National Research Council.

IN PRENATAL NUTRITION
In the aim for optimal nutrition without undue weight gain during the entire prenatal period, oatmeal serves well as a universally accepted food high in nutrient value without "empty" calories.

Few foods can better the broad nutrient spectrum of the oatmeal serving. For its caloric content its nutritional contribution may well be unique, and justifies the physician's continued recommendation of "an oatmeal breakfast" for every age, for the normal as well as the therapeutically indicated diet.

Quaker Oats and Mother's Oats, the two brands of oatmeal marketed by The Quaker Oats Company, are identical in their content of all nutrients. Both brands are available in the Quick (cooks in one minute) and the Old-Fashioned (cooks in five minutes) varieties.

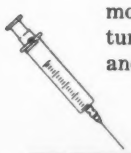
The Quaker Oats Company
CHICAGO

In Buenos Aires, too, you'll find Pentothal in constant use,

ARTHUR SHILSTONE

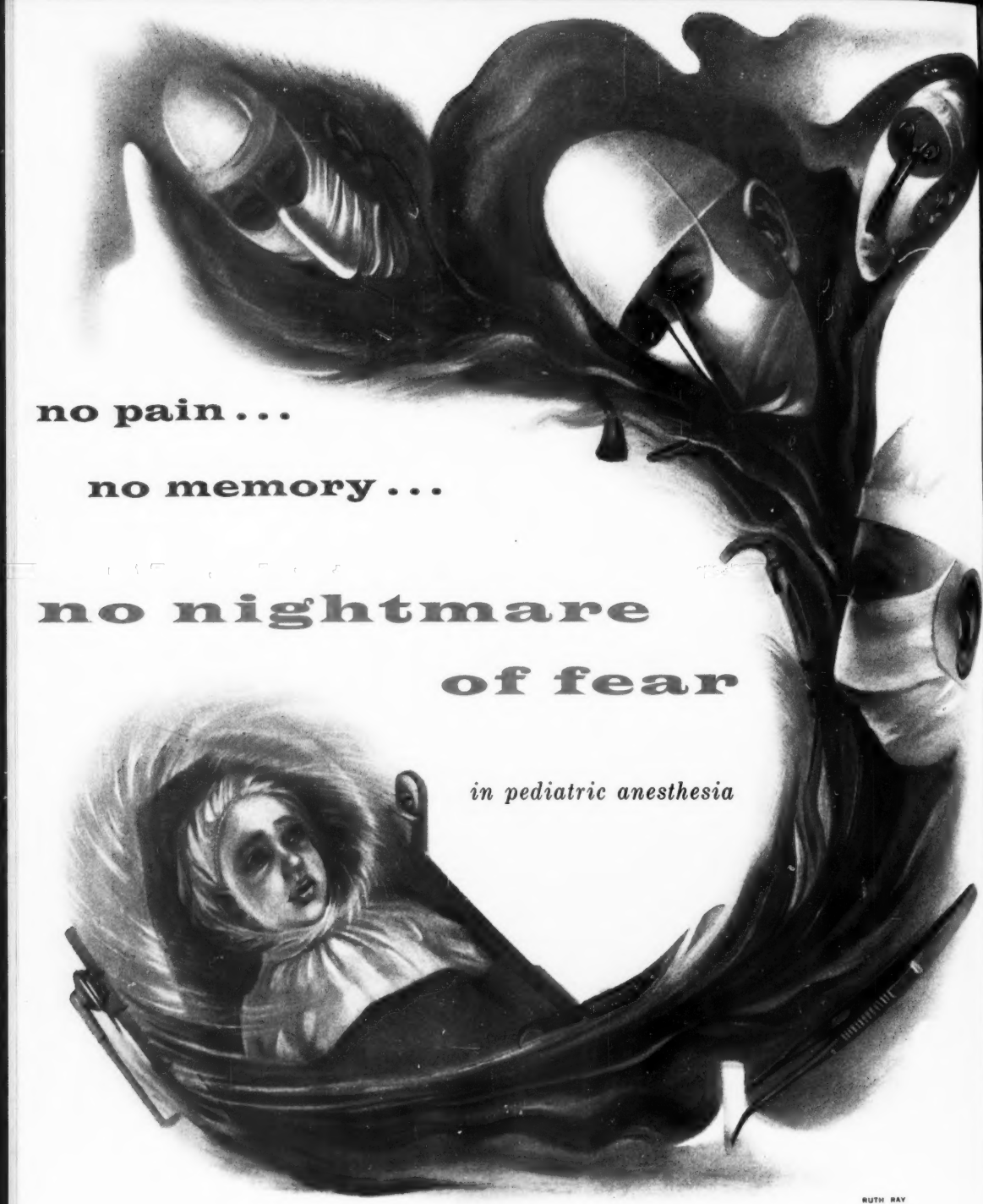
tribute to the fact... **there's no safer, more effective intravenous anesthetic, the world over**

In all the important cities of the world, wherever modern medicine is practiced, PENTOTHAL Sodium is in almost constant use as an agent of choice, in management of anesthesia. This acceptance, reflected in more than 2400 published medical reports, has created a world literature unparalleled in the history of modern intravenous anesthesia. Twenty years of use stand behind your trust. Abbott



PENTOTHAL® Sodium

(Thiopental Sodium for Injection, Abbott)



Your young patient is spared the nightmare of the operating room with PENTOTHAL Sodium administered rectally. He goes to sleep in his own bed, awakens there with complete amnesia of events between.

And, because Rectal PENTOTHAL reduces the dosage of inhalation and supplementary agents, after-effects are markedly lessened. As a basal anesthetic, or as a sole agent in minor procedures, PENTOTHAL by rectum affords a notably safe and simple approach to pediatric anesthesia. Abbott

PENTOTHAL® Sodium

(Thiopental Sodium, Abbott)

in rheumatoid arthritis

continuing benefits

for successful corticosteroid therapy

METICORTELONE*

(PREDNISOLONE)

- therapy usually undisturbed by sodium retention, edema, weight gain
- excellent relief of arthritic pain, swelling, tenderness
- spares patients salt-poor diets
- up to 5 times as potent as hydrocortisone

Available as 1, 2.5, and 5 mg. tablets

METICORTELONE,* brand of prednisolone. *T. M. ML-J-66-256

Schering

ROLLPRUF®

SURGICAL GLOVES

Deserve Your Complete Confidence

PIONEER ROLLPRUFS

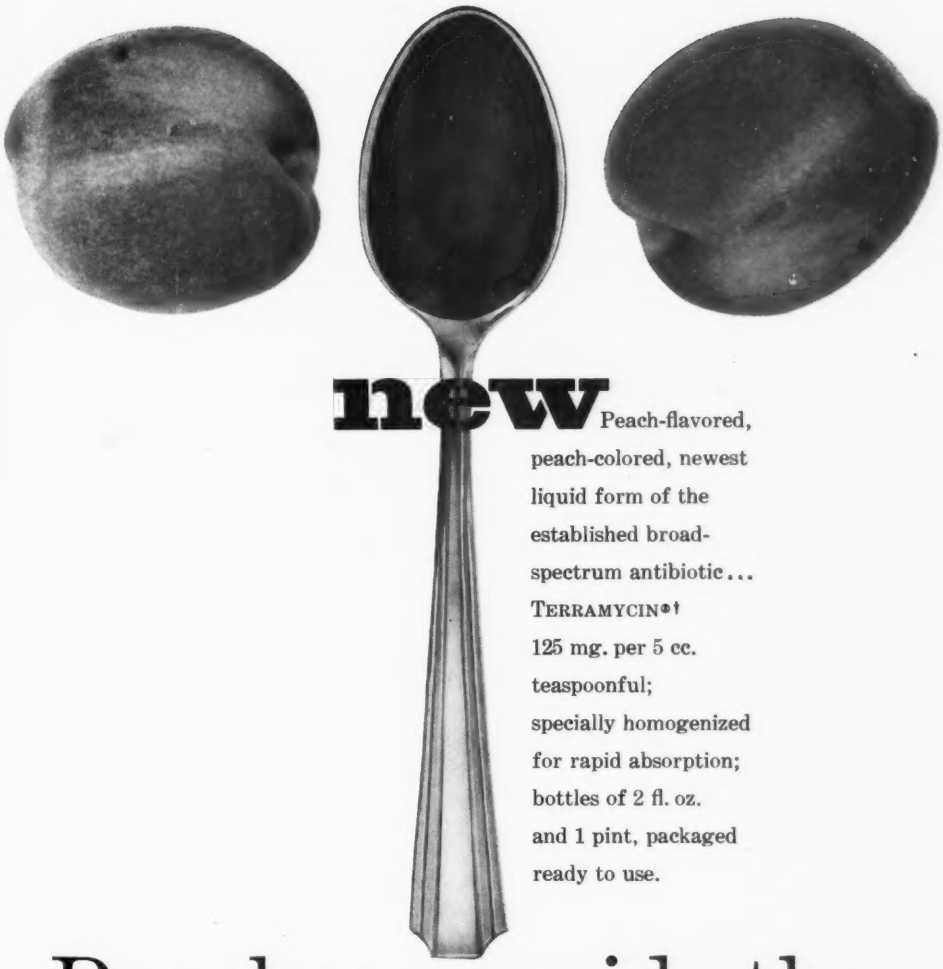
UNTREATED SURGICAL GLOVE

● *Since May, 1952 Processed To Prevent the Ozone Cracking Common To Many Surgical Gloves. Insist on Rollprufs because they stay safe longer.*

the PIONEER Rubber Company

386 Tiffin Road, Willard, Ohio, U.S.A.

Pioneers in Surgical Glove Improvement for over 35 Years



new Peach-flavored, peach-colored, newest liquid form of the established broad-spectrum antibiotic... TERRAMYCIN®† 125 mg. per 5 cc. teaspoonful; specially homogenized for rapid absorption; bottles of 2 fl. oz. and 1 pint, packaged ready to use.

Peaches provide the delightful new taste in

TERRABON*

BRAND OF OXYTETRACYCLINE

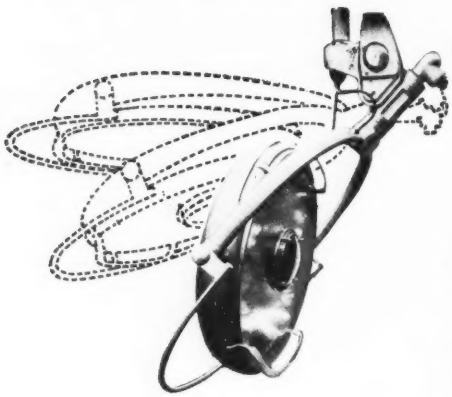
HOMOGENIZED MIXTURE

PFIZER LABORATORIES, *Division, Chas. Pfizer & Co., Inc.*, Brooklyn 6, N. Y. Pfizer

*Trademark †Brand of oxytetracycline

ONLY *Castle* "60 SERIES" LIGHTS

. . . GIVE TOTAL HEMISPHERIC MANEUVERABILITY



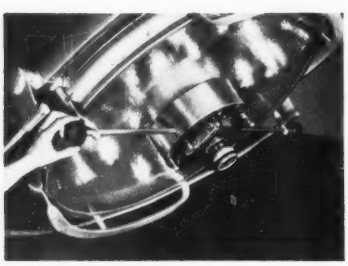
"FLOATING" OFFSET SUSPENSION INSURES EFFORTLESS, INSTANT RE-POSITIONING WITHOUT TRACKS OR HAZARDOUS COUNTERWEIGHTS

IN VERTICAL PLANE — cam-balanced lamphead "floats" up and down at finger touch, but it is rarely necessary to adjust lamphead. The Castle light is in perfect focus 30 to 60 inches from the source!

IN TRUE HORIZONTAL PLANE - lamphead descends, pivots fully to illuminate gynecologic or perineal procedures. Five reflectors flood field with soft radiance at surgeon's touch of sterile control handles. Unprecedented deep cavity penetration is without glare or shadow.

IN LATERAL ANGULATION - lamphead swings effortlessly in full 8′ 3″ circle. May be centered under suspension, or directed obliquely from side and end table positions without crowding team. Vital for kidney, radical mastectomy, intratracheal procedures, thoracic, orthopedic, suprapubic and allied approaches.

INSTANT COLOR PHOTOGRAPHY. . . *AS IT HAPPENS!*



For emergency photography, Castle's new COLOR CAMERA ATTACHMENT is recessed in lamphead in place of Center Spotlight. Holds pre-set Kodak 35mm camera. 20 or 36 exposures without reloading. Film advanced, shutter tripped remotely. Range-finder spotlights for perfect focusing. No flash bulbs required.

WRITE TODAY for complete specifications on Models 61, 62 and 63, and details of Color Camera Attachment.

Castle LIGHTS and STERILIZERS

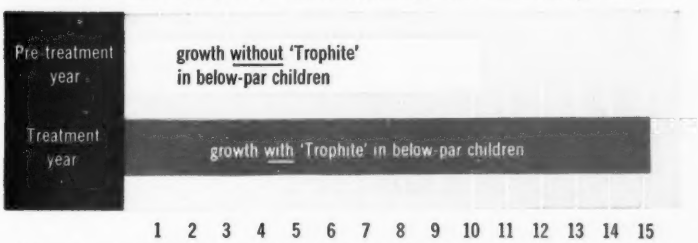
WILMOT CASTLE COMPANY

1809 E. Henrietta Rd. Rochester, N. Y.

for the child
who "just won't eat"

In a one-year, controlled study of children with secondary growth failure or clinical malnutrition, 'Trophite'—high dosage of B_{12} and B_1—increased growth by nearly 50% (see graph below).

AVERAGE GROWTH AND DEVELOPMENT RATE—LEVELS/YEAR


Pre-treatment year
growth without 'Trophite' in below-par children
Treatment year
growth with 'Trophite' in below-par children
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

(These levels represent growth in terms of both height and weight according to Wetzel's Grid technique.)

Try 'Trophite' in the child who "just won't eat." Both you and his parents will be delighted with his new appetite.

'Trophite' is available both as a truly delicious liquid and as tablets. Each teaspoonful (5 cc.) or tablet supplies: 25 mcg. B_{12}, 10 mg. B_1.

the high potency combination of B_{12} and B_1

Trophite* *for* appetite

*T.M. Reg. U.S. Pat. Off. *Smith, Kline & French Laboratories, Philadelphia*

new

Against Pathogen & Pain

in urinary tract infections

Azo Gantrisin combines the single, soluble sulfonamide, Gantrisin, with a time-tested urinary analgesic - in a single tablet.

Prompt relief of pain and other discomfort is provided together with the wide-spectrum antibacterial effectiveness of Gantrisin which achieves both high urinary and plasma levels so important in both ascending and descending urinary tract infections.

Each Azo Gantrisin tablet contains 0.5 Gm Gantrisin 'Roche' plus 50 mg phenylazo-diamino-pyridine HCl. Gantrisin® - brand of sulfisoxazole

ROCHE | Original Research in Medicine and Chemistry

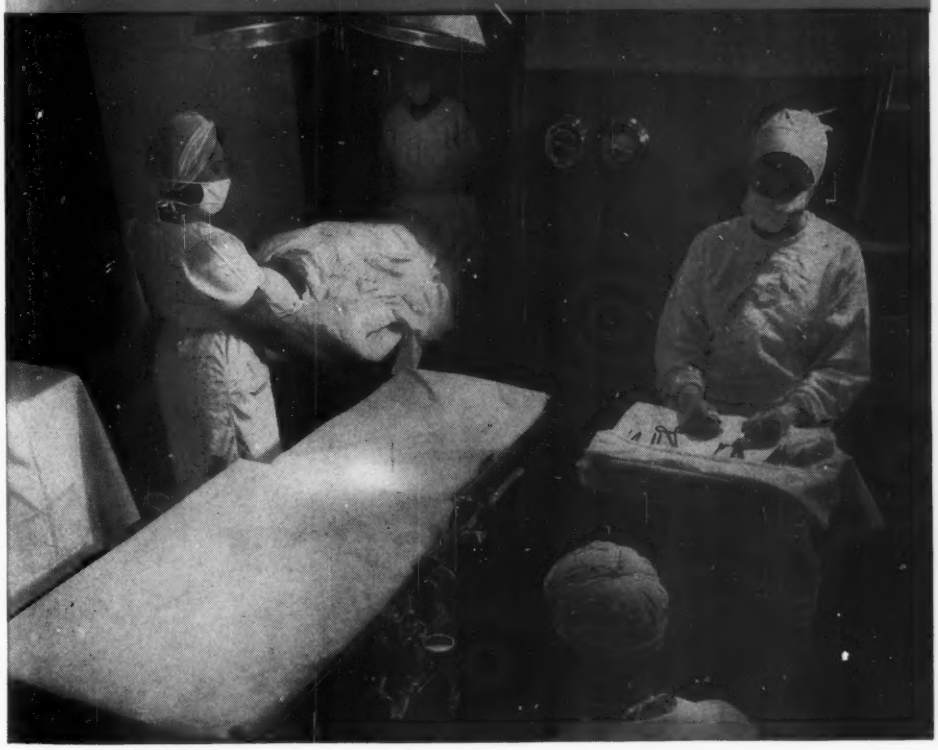
EMULSION OF

Mephyton®

(VITAMIN K_1, MERCK)

Preferred product for routinely stabilizing prothrombin levels before surgery

MAJOR ADVANTAGES: Action detectable within 15 minutes; complete reversal of hypoprothrombinemia within 4-12 hours.



There are three significant reasons for preferring MEPHYTON over the menadione derivatives. The action of MEPHYTON is: (1) more rapid, (2) more complete, and (3) more prolonged. These advantages apply to either simple vitamin K deficiency states or in anticoagulant-induced hypoprothrombinemia. In the latter condition, MEPHYTON provides the *most* dependable and practical means of restoring normal levels of prothrombin.

INDICATIONS: Hypoprothrombinemia due to Dicumarol®, Cumopyran®, Hedulin®, Tromexan®, antibiotics, salicylates, obstructive jaundice, hepatic disease, impaired gastrointestinal absorption, and deficiency of vitamin K in the newborn.

SUPPLIED: In boxes of six 1-cc. ampuls, each cc. containing 50 mg. of vitamin K_1.

SHARP & DOHME

PHILADELPHIA 1, PA.
DIVISION OF MERCK & CO., INC.

invisible glove

SEPTISOL®

with HEXACHLOROPHENE 0.75%

ANTISEPTIC
LIQUID
SOAP

Regular washing with SEPTISOL forms an invisible but protective film on the skin, which through cumulative action keeps on killing bacteria—even many hours after washing—with complete skin safety.

Vestal INCORPORATED

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ST. LOUIS 10, MISSOURI

RESECTION OF MUCOCELE: Preoperative radiograph, A-P view

Radiography at work...*with color photography*

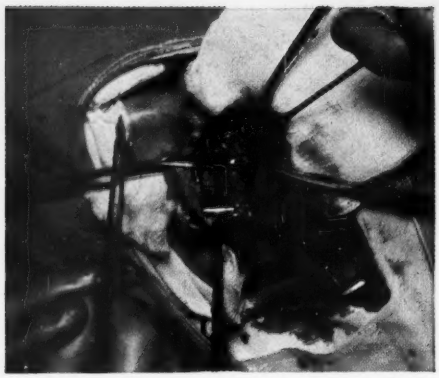
Preoperative photograph of patient. *See following page for additional steps in surgery.*

Here are radiography and photography working together to broaden the scope of medical knowledge, increase its usefulness.

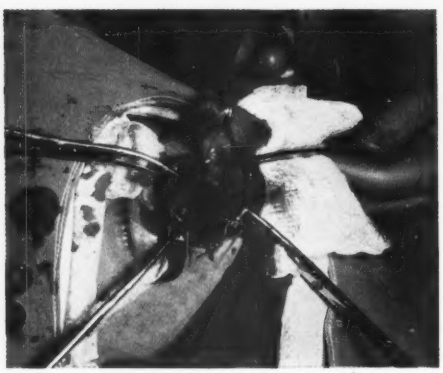
With visual data such as shown, the physician has material for research and review, for teaching or discussion. Anytime he wishes, he can retrace steps in the treatment of the case—show the radiographs which helped him establish his diagnosis—show the steps in surgery or therapy, clearly, objectively.

Kodak
TRADEMAR

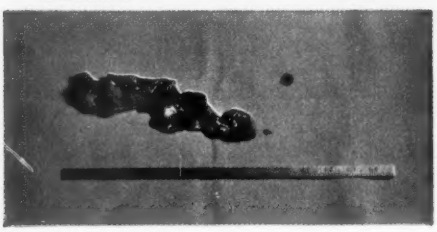
1. Removal of outer cortex of frontal sinus.



2. Frontal sinus cortex removed—*mucocele membrane* in evidence.



3. *Mucocele membrane* being removed from frontal sinus.



4. Portion of *mucocele.*

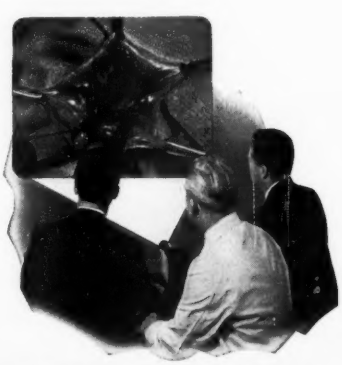
5. Photomicrograph of *mucocele membrane.* (Magnification, X10.)

For Radiography: Kodak Blue Brand X-ray Film and Kodak x-ray processing chemicals meet the most exacting requirements. They are always dependable—uniform. Quality-controlled—rigidly tested—they are *made to work together.*

For Color Photography: Kodachrome Film for miniature and motion-picture cameras;

Kodak Ektachrome Film and Kodak Ektacolor Film, Type B, for sheet-film cameras;

Kodak Ektachrome Roll Film for roll-film and miniature cameras.



Order x-ray products from your x-ray dealer, photographic products from your photographic dealer.

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EASTMAN KODAK COMPANY, *Medical Division*, Rochester 4, N. Y.

XYLOCAINE® HCl SOLUTION ASTRA

The Name That Marks a New Era in Local Anesthesia

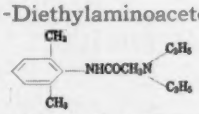
Xylocaine provides peak values in:

• **Duration** • **Clinical Effectiveness** • **Clinical Tolerance** • **Speed**
• **Stability** • **Versatility** • **Clinical Predictability** • **Safety** • **Depth**

Trade Name: XYLOCAINE **Generic Name**: lidocaine*

Chemical Name: α -Diethylaminoaceto-2,6-xylidide

Chemical Structure:



Potency: Two to three times that of procaine.

Duration of Action: Two to three times that of procaine.

Anesthetic Index: 1.8. **Surface Anesthetic Index**: 8.

Safety Factor: Two to three times that of procaine (because smaller concentrations and volumes are clinically as effective).

Sensitivity: Allergic manifestations and sensitizing reactions have never been reported.

Inhibition of Therapeutic Action of Sulfonamides or Antibiotics: None.

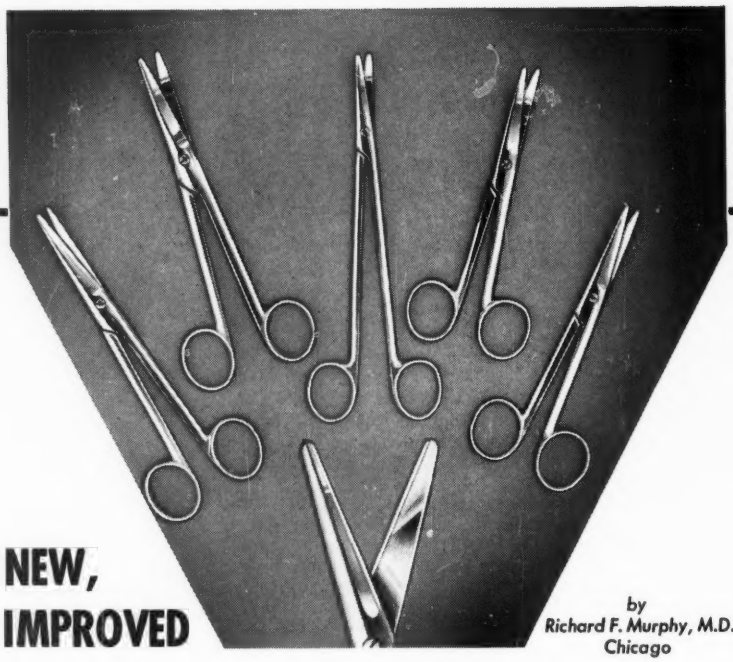
Versatility: Effective in local infiltration anesthesia; in major conduction anesthesia; in temporary therapeutic blocks for relief of pain; in topical anesthesia.

Available on Request: Descriptive literature, bibliography, and trial supply.

Supplied: Vials, 0.5%, 1% and 2% in 20 cc. and 50 cc. without and with epinephrine 1:100,000; 100 cc. vials, 1% without epinephrine. Ampoules, 2 cc., 2% without and with epinephrine 1:100,000.

Astra Pharmaceutical Products, Inc., Worcester 6, Mass.

*U. S. PATENT NO. 2,441,498



NEW, IMPROVED

by
Richard F. Murphy, M.D.
Chicago

R65 Dissecting Scissors With Sure-Cutting Tungsten Carbide Blades

These improved stainless steel scissors *with hard tungsten inserts as cutting edges* have proved highly successful. They are being used to cut fascia, peritoneum, muscle, scar tissue, cartilage, uterus, ligamentous tissue, silk and catgut suture materials. They have been washed and sterilized with other instruments and in the regular manner. Rough handling has failed to damage the cutting edges, and after hard usage the instruments remain as sharp as the day they were made. The tungsten edges are permanently bonded to the blades, and there is no nuisance of replacing blade edges.

See Armamentarium Vol. II, No. VI.

MO-1601—METZENBAUM Tonsil Scissors	Each	**$15.30**
In dozen lots, each		**12.75**
SU-1803—MAYO Dissecting, straight, 5½″ length, each		**14.25**
In dozen lots, each		**11.85**
SU-1804—MAYO Dissecting, straight, 6¾″ length, each		**14.50**
In dozen lots, each		**12.15**
SU-1813—MAYO Dissecting, curved, 5½″ length, each		**15.30**
In dozen lots, each		**12.75**
SU-1814—MAYO Dissecting, curved, 6¾″ length, each		**15.50**
In dozen lots, each		**13.00**

Armamentarium

V. MUELLER & CO.
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to help the depressed and anxiety-ridden housewife who is surrounded by a monotonous routine of daily problems, disappointments and responsibilities . . .

With 'Dexamyl' you can often help her to face her problems; help her to regain lost interests; help her to rediscover the zest and purpose in life. The normalizing effect of 'Dexamyl' is free of the dullness caused by many "anti-anxiety" agents alone, free of the excitation sometimes caused by stimulants alone. Her mood normalized, disturbing mental and physical symptoms often vanish.

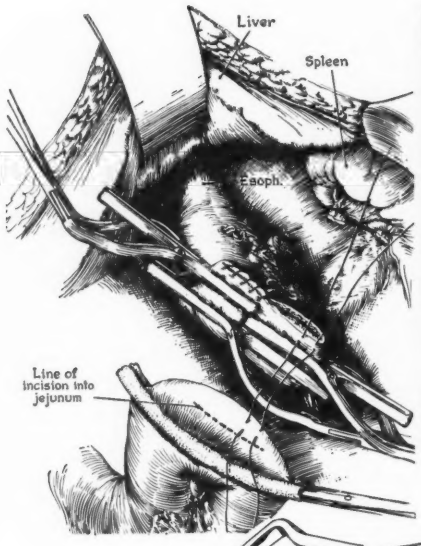
DEXAMYL* tablets • elixir • Spansule† capsules

smoothly and subtly relieves both anxiety and depression

Smith, Kline & French Laboratories, Philadelphia

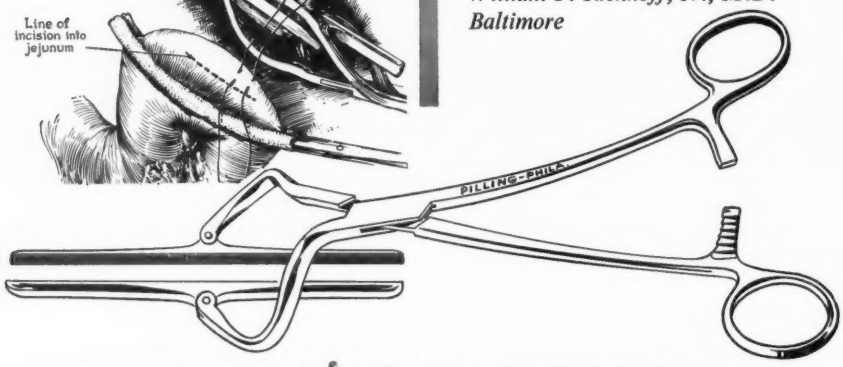
*T.M. Reg. U.S. Pat. Off.

†T.M. Reg. U.S. Pat. Off. for sustained release capsules, S.K.F.



RIENHOFF *ARTICULATED* ABDOMINAL CLAMP

Designed for
William F. Rienhoff, Jr., M.D.
Baltimore



A new stomach or intestinal clamp for a more refined technic of gastrectomy . . .

This clamp offers many advantages in gastrointestinal surgery:

- **Evenly Distributed Pressure**

Pressure is applied in the center of the blades —there is no scissors-like action.

- ***ATRAUMATIC**** **Blades**

Fine teeth provide firm hold on viscus, yet do not penetrate or traumatize wall of stomach or intestine. Non-crushing. Tissue between blades is in no way devitalized nor is the circulation jeopardized. Only the serosa is penetrated.

- **Positive Grip**

No gauze or rubber covering of the blades is necessary—*Atraumatic* jaws ensure positive grip—will not slip.

- **Versatile in Use**

Articulated Clamps may be applied for any type of partial or total gastrectomy desired. The angle of the handle affords an excellent tractor to be held by a second assistant.

- **Literature, "Technic of Use" is available.**

B2490—$65.00 f.o.b. Phila.—Price subject to change without notice.

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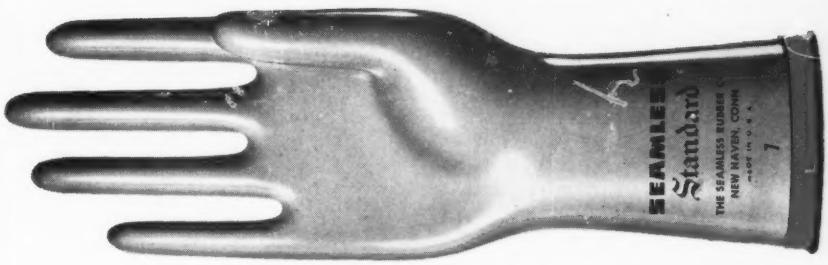

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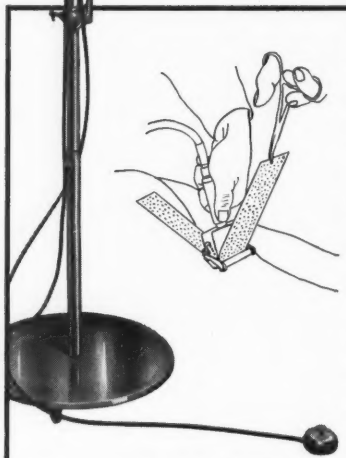
6 POWERED SURGICAL INSTRUMENTS AT THE SURGEON'S FINGER TIPS WITH Stryker Electro-Surgical Unit

One of a Series — THE STRYKER ROLO-DERMATOME

The Stand and Mayo Table is a convenient accessory. Hospitals may assure compliance with National Board of Fire Underwriter Standards for operating room safety by using the Stand which guarantees mounting of the motor above 5 ft.



Because of the small size and compact construction of the Dermatome, every desired graft site is completely accessible. The 35,000 cutting strokes per minute eliminates vibration and assures perfect control. Throw-away blades are easy to change.

Desired graft thickness is easily set by one simple lever — from 5/1000″ to 30/1000″. Maximum graft width is 3″. Stationary parts contacted by blade are carboloy for long wear. Only two parts to clean.

Dermatome rolls, rather than slides, requiring no skin preparation. Stryker skin tape can be used if desired.

Stryker Rolo-Dermatome guaranteed for two years.

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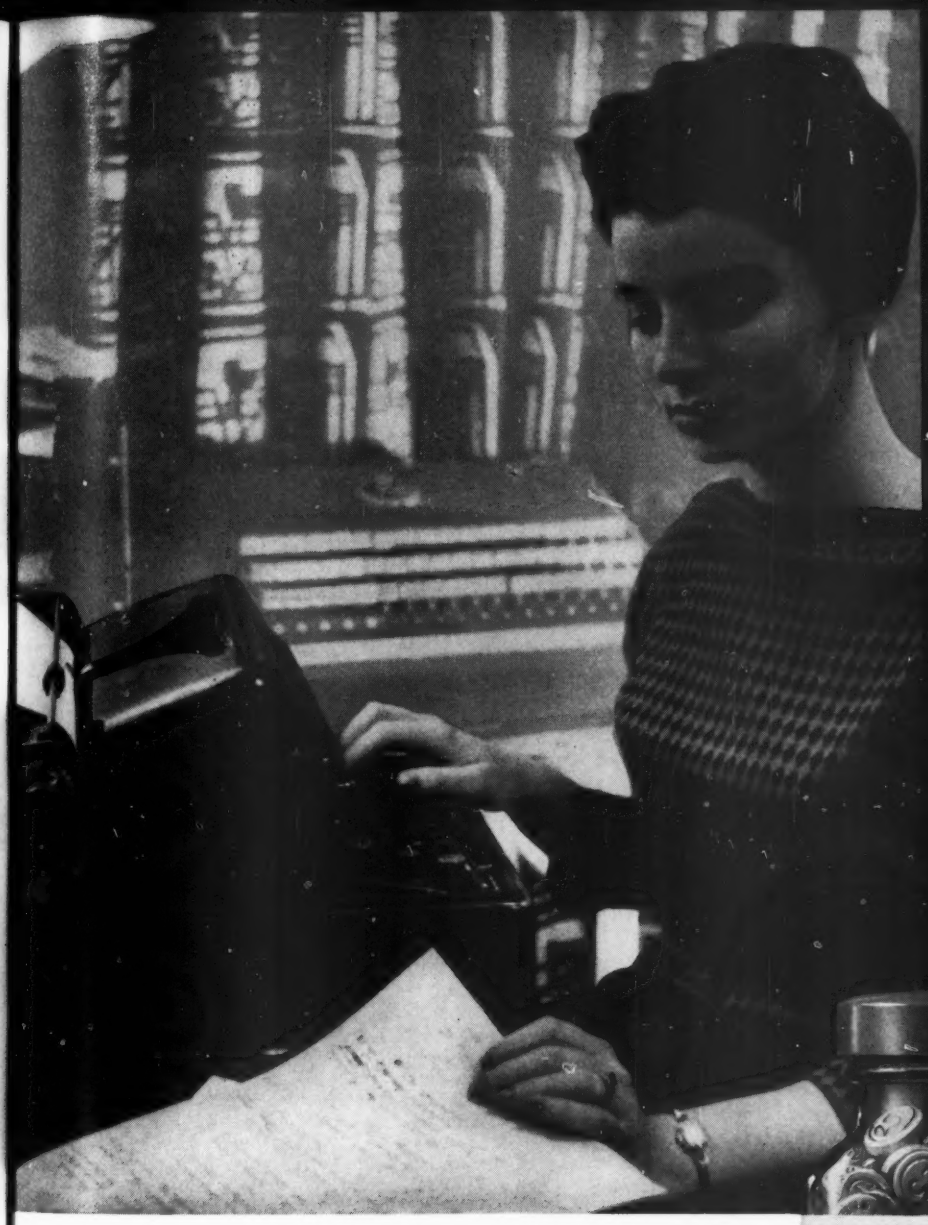

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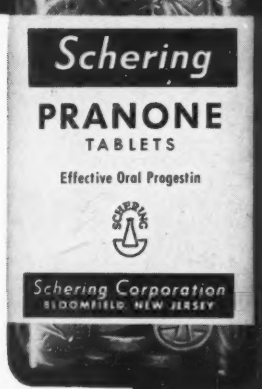
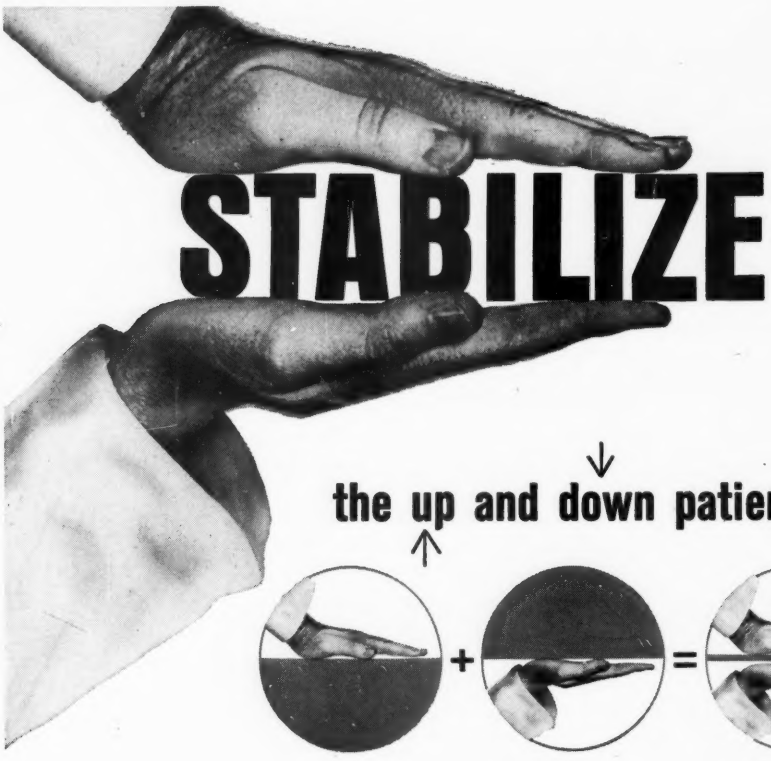
A major cause of absenteeism, dysmenorrhea represents a serious economic handicap to the more than one in three menstruating women with this complaint. PRANONE produces "brilliant results," and more physiologic relief of dysmenorrhea,* significantly reducing absenteeism from this cause.

PRANONE® Tablets (brand of Ethisterone U.S.P.) are available in 5, 10 and 25 mg. strengths.

*Parsons, L., and Tenny, B., Jr.: M. Clin. North America *34*:1537, 1950.

CL-J-51





To induce emotional equilibrium in those who swing from anxiety to depression, Serpatilin combines the relaxing, tranquilizing action of Serpasil with the mild mood-lifting effect of the new cortical stimulant, Ritalin. In recent months, numerous clinical studies have indicated the value of combining these agents for the treatment of various disorders marked by tension, nervousness, anxiety, apathy, irritability and depression. Arnoff,[1] in a study of 51 patients, found the combination of definite value in a variety of complaints, noting no effect on blood pressure or heart rate. Lazarte and Petersen[2] also found Serpatilin effective in counteracting the side effects of reserpine and chlorpromazine. They reported: "The stimulating effect of Ritalin seemed complementary to the action of reserpine . . . in that it brought forth a better quality of increased psychomotor activity."

1. Arnoff, B.: Personal communication. 2. Lazarte, J. A., and Petersen, M.C.: Personal communication.

Serpatilin Tablets, 0.1 mg./10 mg., each containing 0.1 mg. Serpasil® (reserpine CIBA) and 10 mg. Ritalin® hydrochloride (methyl-phenidylacetate hydrochloride CIBA).

Dosage: 1 tablet b.i.d. or t.i.d., adjusted to the individual.

CIBA
SUMMIT, N. J.

Serpatilin T.M.

(reserpine and methyl-phenidylacetate hydrochloride CIBA)

2/2289M

LEVOPHED® "...benefited these patients more than other pressor drugs..."[1]

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natural antishock pressor hormone

LEVOPHED (levarterenol) given promptly raises blood pressure in seconds in surgery, hemorrhage, trauma, anesthesia.

Among 111 patients, "...99 exhibited an appreciable increase in blood pressure ...Many had shown no response to blood transfusions alone."[2] In another series of 75 patients in profound circulatory collapse Levophed was found most useful where the shock was due to spinal anesthesia, sympathectomy or hemorrhage during surgery. In this "most useful" group the survival rate was 94 per cent as compared to 40 per cent in the total series.[1]

With LEVOPHED – onset of action almost immediate... pressor effect easily, accurately controlled... peripheral vasoconstriction only...blood pressure levels maintained almost indefinitely...heart rate slowed, coronary arteries dilated, oxygen supply to heart increased...shock damage to kidney and brain prevented.[1]

1. Eisenhofer, J. E. and Dripps, R. D.: Anesthesiology, 15:681, Nov., 1954. 2. Sokoloff, Louise King, B. Jr. and Wechsler, R. L.: Med. Clin. North America, 38:491, Mar., 1954.

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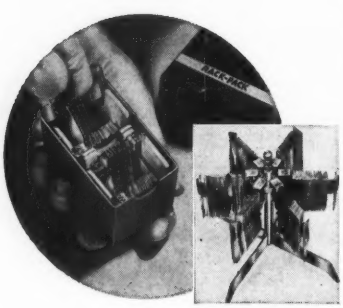
must 'survive' a rigid series of progressive scientific tests to qualify as suitable for surgical use. Those that 'pass' are surgically perfect and uniformly sharp throughout their entire cutting edge. They will remain sharp and useful for longer periods . . . an important factor in economy when yearly volume of purchases is considered.



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SURGICAL OPERATING TABLE

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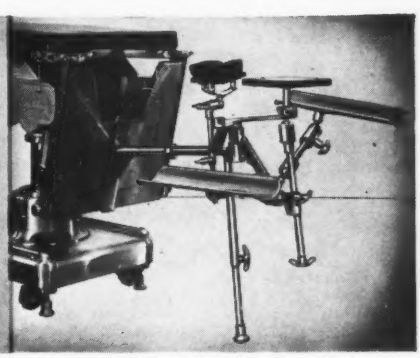
Your copy of Accessory Brochure C-183 is available upon request.

Narrow Table Attachment for infant surgery and head and neck surgery permits surgeon ideal proximity to operative site.

Illustrating use of Arm Support, Headrest and Restraint Strap appropriate for a neurosurgical procedure in the upright position.



Thoracic Frame for prone positioning provides unobstructed access to the operative site, minimum shock to patient and progressive posturing during procedure.

Now, for only $4950* G. E. brings you complete 200-ma x-ray facilities

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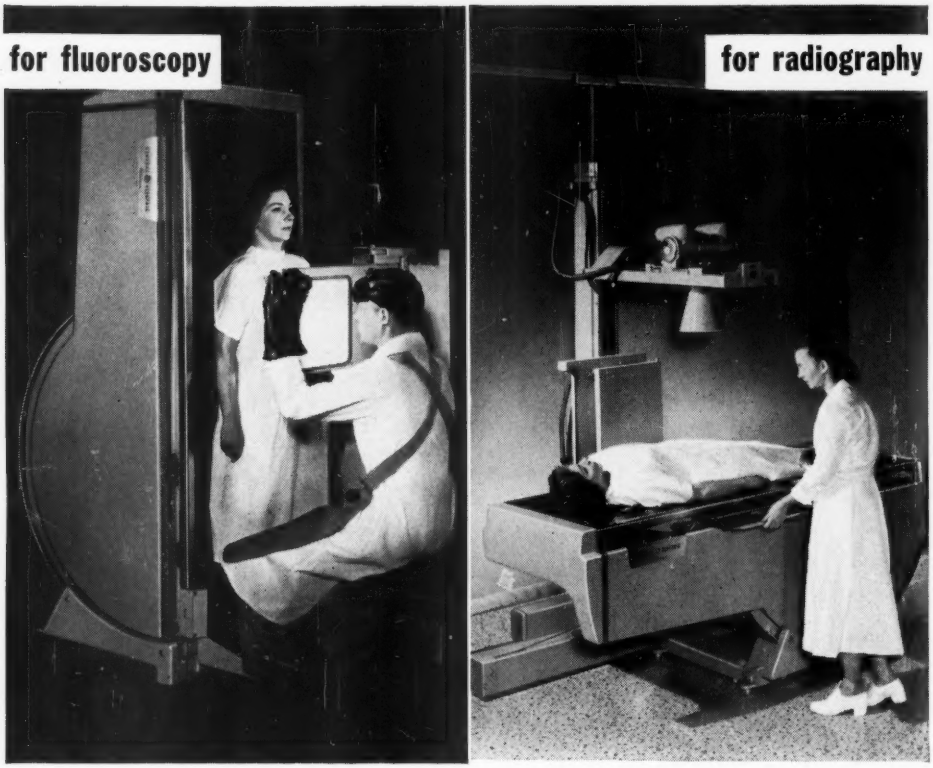

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Makes induction
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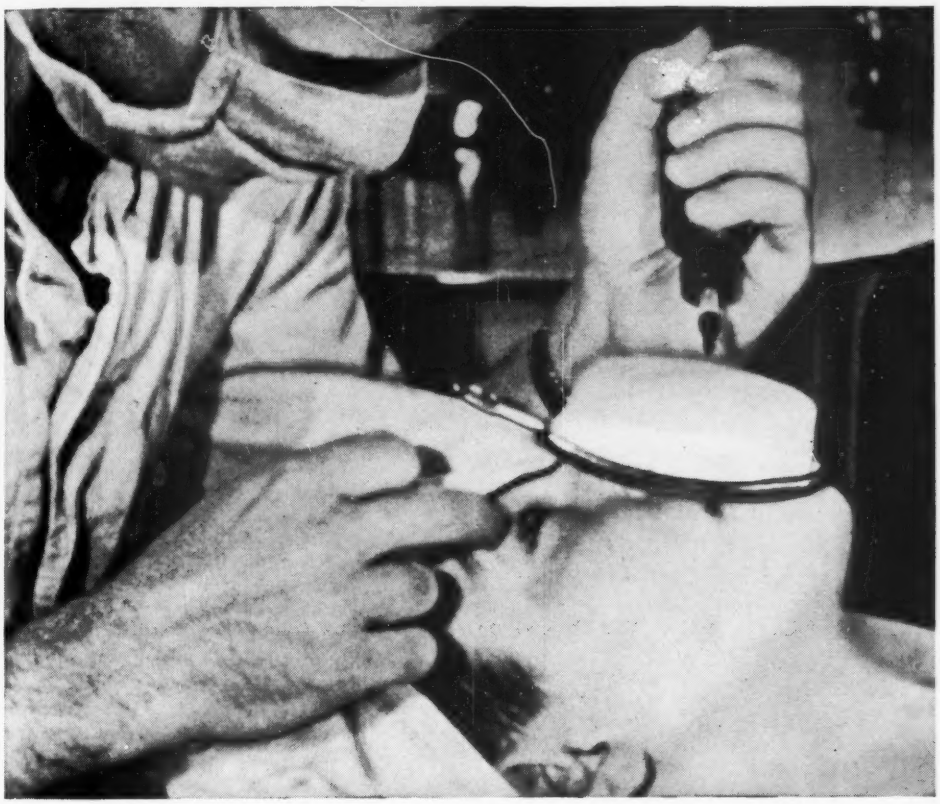

MAJOR ADVANTAGES: Rapidly traverses the second stage, rarely nauseating, does not affect circulatory system or depress respiration.[1]

Vinethene®

(VINYL ETHER FOR ANESTHESIA U.S.P., MERCK)

The rapid action of 'Vinethene' and its almost complete lack of irritant effect on mucous membranes recommend it for induction purposes. The patient is saved the discomfort produced by ethyl ether and the anesthesiologist seldom has to cope with the excitement of a prolonged second stage. 'Vinethene' is easily administered via the open drop, semi-closed or closed technics.

OTHER INDICATIONS: For short operative procedures and as a supplement to nitrous oxide or ethylene.

SUPPLIED: In boxes of three 10-cc. bottles and in bottles of 25, 50, and 75 cc., each with adjustable plastic dropper cap.

Reference: 1. Adriani, J.: *Techniques and Procedures of Anesthesia*, Charles C Thomas, Springfield, Illinois, 1952, pp. 92-95.

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DIVISION OF MERCK & CO., INC.

MAJOR...OR...MINOR

TELFA lifts off easily without sticking, even from this very long midline incision. Stitches are never irritated nor is healing disturbed

Note easy removal of TELFA on 6th day after excision of neck tumor. Wound is dry, healing is well-advanced, and removal is painless.

WHATEVER THE WOUND, DRESS IT WITH TELFA

Wounds heal faster with a TELFA dressing. Doesn't stick... and no pain when you take it off

Now you can dress any wound with TELFA—wounds that you have heretofore dressed with gauze, or with sponges and pads.

TELFA is now available in two forms: TELFA Non-Adherent *Strips*, for simple, minor wounds and the new TELFA Non-Adherent *Sponge-Pads* for all routine surgical wounds and even for drainage cases.

This means that you can now employ the advanced TELFA *technique throughout your dressings practice.*

Because of its perforated "plastic skin" that goes next to the wound, TELFA absorbs drainage without sticking to the wound. Removal is simple, painless and does not disturb healing tissue or stitches.

Result: you get fast, *primary* healing . . . less patient discomfort.

Nature heals best when healing tissue is not disrupted. Use TELFA *routinely*. TELFA Strips, in 2″ x 3″ and 3″ x 4″ sterile envelopes; bulk cases in 2½″ x 4″, 3″ x 8″, 8″ x 10″. TELFA Sponge-Pads, in 4″ x 5″ and 5″ x 9″ pads.

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MUSCLE-RELAXING ACTION

Equanil®

MEPROBAMATE

(2-methyl-2-n-propyl-1,3-propanediol dicarbamate)

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For significant relief in myositis, osteoarthritis, backstrain, and related conditions marked by:

- ***Muscle spasm***
- ***Stiffness and tenderness***
- ***Restriction of motion***
- ***Pain***

As a superior muscle-relaxant, EQUANIL offers predictable action and full effectiveness on oral administration. It does not disturb autonomic function and is relatively free from gastric and other significant side-effects. Its anti-anxiety property provides important correlative value.

Usual dosage: 1 tablet t.i.d. The dose may be adjusted either up or down, according to the clinical response of the patient.

Supplied: Tablets, 400 mg., bottles of 50.

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anti-anxiety factor
with muscle-relaxing action
...relieves tension

Clinical evidence[1, 2, 3] indicates that to augment the therapeutic advantages of Prednisone and Prednisolone, antacids should be routinely co-administered

A Multiple Compressed Tablet of 'CO-DELTRA' or 'CO-HYDELTRA' is specifically designed as a "tablet within a tablet" to provide stability and to release in sequence, antacid and anti-inflammatory agents . . .

1. the outer layer of antacids comes in contact with the gastric mucosa first . . . and after it is completely dissolved . . .

2. the hitherto intact inner core containing the steroid then begins to release its full therapeutic potential and not before.

'CO-DELTRA' and 'CO-HYDELTRA' are the trademarks of Merck & Co., Inc.

All the benefits of prednisone and prednisolone:

1. less sodium and water retention.
2. marked anti-inflammatory activity at low dosage.
3. prompt response even in patients refractory to other steroids.

PLUS

A. positive antacid action to minimize gastric distress.

B. full potency and stability.

C. uniform dependable results.

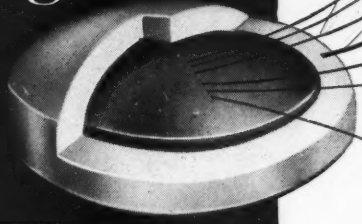
D. greater flexibility of dosage with the addition of the new 2.5 mg. strength.

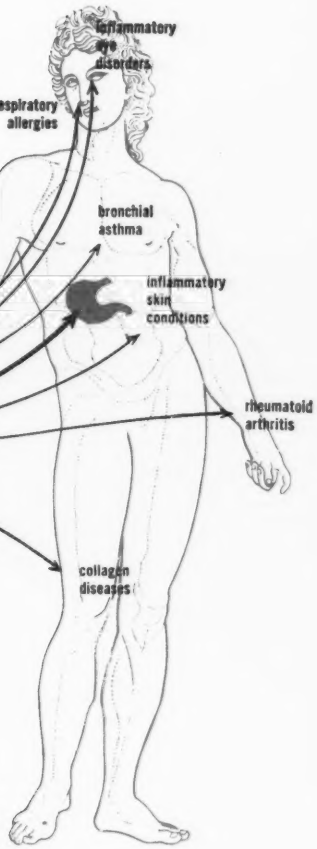
References: 1. Boland, E. W., *J.A.M.A.* **160**:613, February 25, 1956. 2. Margolis, H. M., *et al. J.A.M.A.* **158**:454, June 11, 1955. 3. Bollet, A. J., *et al. J.A.M.A.* **158**:459, June 11, 1955.

New

2.5 mg.

Multiple Compressed Tablets





'Co-Deltra'

(Buffered Prednisone)

'Co-Hydeltra'

(Buffered Prednisolone)

increase the flexibility of therapy with the "predni-steroids"

All *the benefits of prednisone and prednisolone* plus *greater antacid-to-steroid ratio to minimize gastric distress during maintenance therapy.*

The new 2.5 mg. tablets of 'CO-DELTRA' and 'CO-HYDELTRA' together with the 5 mg. tablets give the physician more latitude for precise adjustment of dosage to the individual patient's needs. Cost for either strength tablet is substantially the same as for the steroid alone and in addition the multiple compressed tablets assure routine co-administration of both antacid and steroid components..

Supplied: 'CO-DELTRA' (Prednisone Buffered) and 'CO-HYDELTRA' (Prednisolone Buffered) are available as Multiple Compressed Tablets, each tablet containing 2.5 mg. or 5 mg. of prednisone or prednisolone plus 300 mg. of dried aluminum hydroxide gel, and 50 mg. of magnesium trisilicate.

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Effective in up to 80% of mild hypertensives[1] and in many patients with more severe forms of hypertension.[2]

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Hence, reserpine is not the total active antihypertensive principle of the rauwolfia plant.

Rauwiloid is freed of the undesirable alkaloids of the whole rauwolfia root. Recent investigations confirm the desirability of Rauwiloid (because of the balanced action of its contained alkaloids) over single alkaloidal preparations; "...mental depression...was...less frequent with alseroxylon..."[4]

1. Moyer, J. H., in discussion of Galen, W. P., and Duke, J. E.: Outpatient Treatment of Hypertension with Hexamethonium and Hydralazine, South. M. J. *47*:858 (Sept.) 1954.

2. Finnerty, F. A., Jr.: The Value of Rauwolfia Serpentina in the Hypertensive Patient, Am. J. Med. *17*:629 (Nov.) 1954.

3. Cronheim, G., and Toekes, I. M.: Comparison of Sedative Properties of Single Alkaloids of Rauwolfia and Their Mixtures, Meet. Am. Soc. Pharmacol. & Exper. Therap., Iowa City, Iowa, Sept. 5, 1955.

4. Moyer, J. H.; Dennis, E., and Ford, R.: Drug Therapy (Rauwolfia) of Hypertension. II. A Comparative Study of Different Extracts of Rauwolfia When Each Is Used Alone (Orally) for Therapy of Ambulatory Patients with Hypertension, A.M.A. Arch. Int. Med. *96*:530 (Oct.) 1955.

The dose-response curve of Rauwiloid is flat, and its dosage is uncomplicated and easy to prescribe...merely two 2 mg. tablets at bedtime.

Rauwiloid is the original alseroxylon fraction of India-grown Rauwolfia serpentina, Benth., a Riker research development.

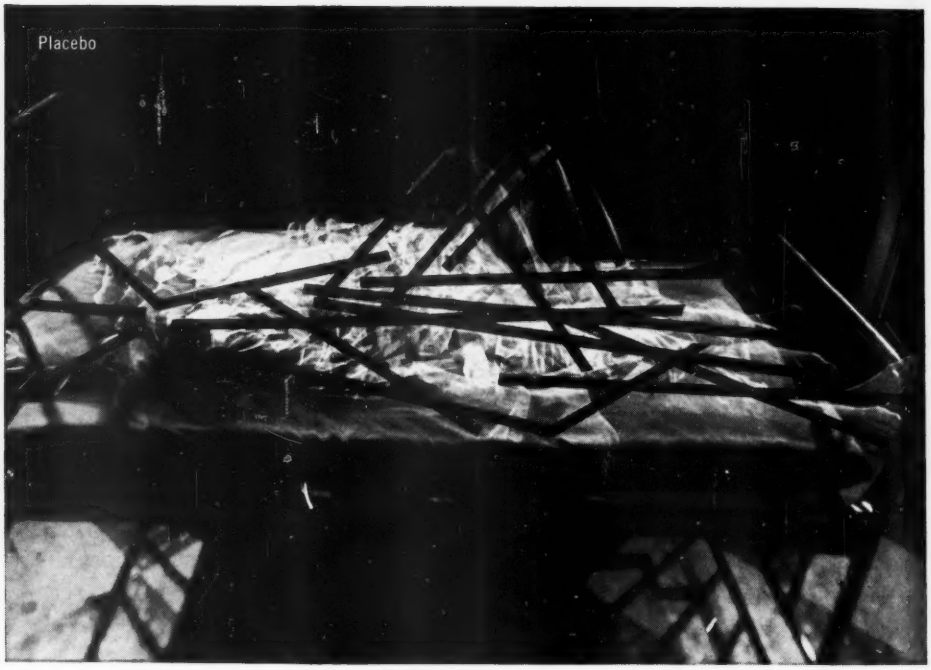
Riker LOS ANGELES

through-the-night photographs show...

NONBARBITURATE

Doriden®

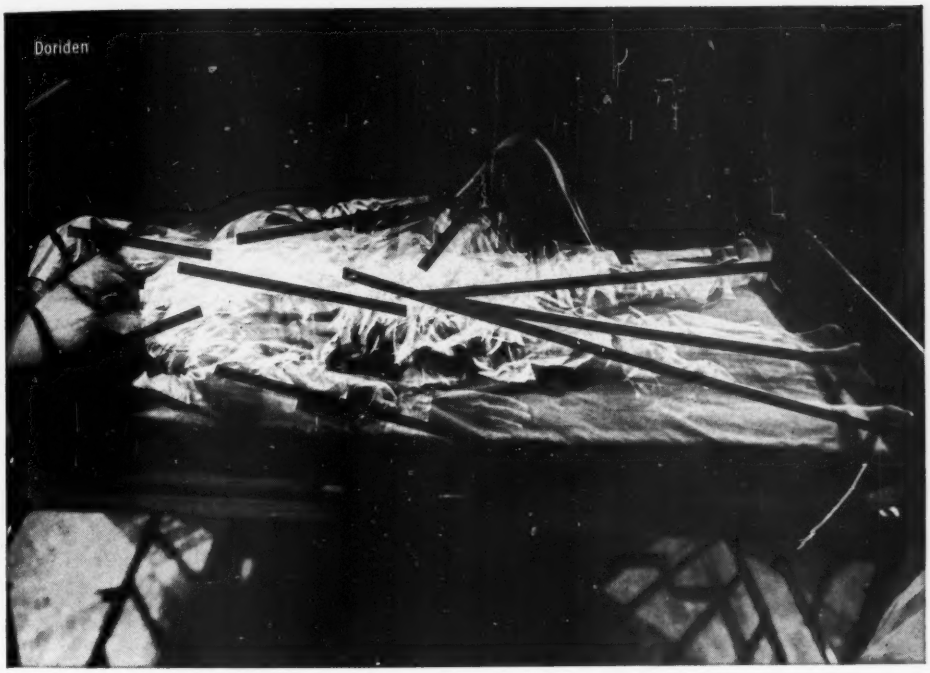
Habituation has not been reported



Twenty-eight-year-old male, restless sleeper, tense personality with occasional insomnia, was photographed at fixed intervals during the night to produce a series of exposures on same sheet of film. On placebo (above), unique "stroboscopic" picture shows him in typical fitful night of unrest.

Further clinical evidence of the sedative and hypnotic effectiveness of DORIDEN is provided by numerous clinical studies. In most cases, Doriden acts in 15 to 30 minutes, affords 4 to 8 hours of refreshing sleep... and come morning, the patient awakens "clear-headed."

induces sound, restful sleep



Same patient on successive night, following administration of Doriden 0.5 Gm. at bedtime, is shown in distinctly more restful repose. Total sleep was achieved in 16 minutes. Close study of activity pattern shows approximately 50 per cent reduction in overt motion and restlessness.

DORIDEN is also an excellent daytime sedative...
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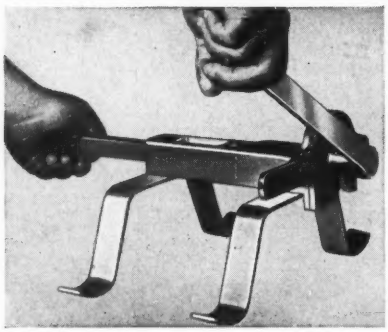

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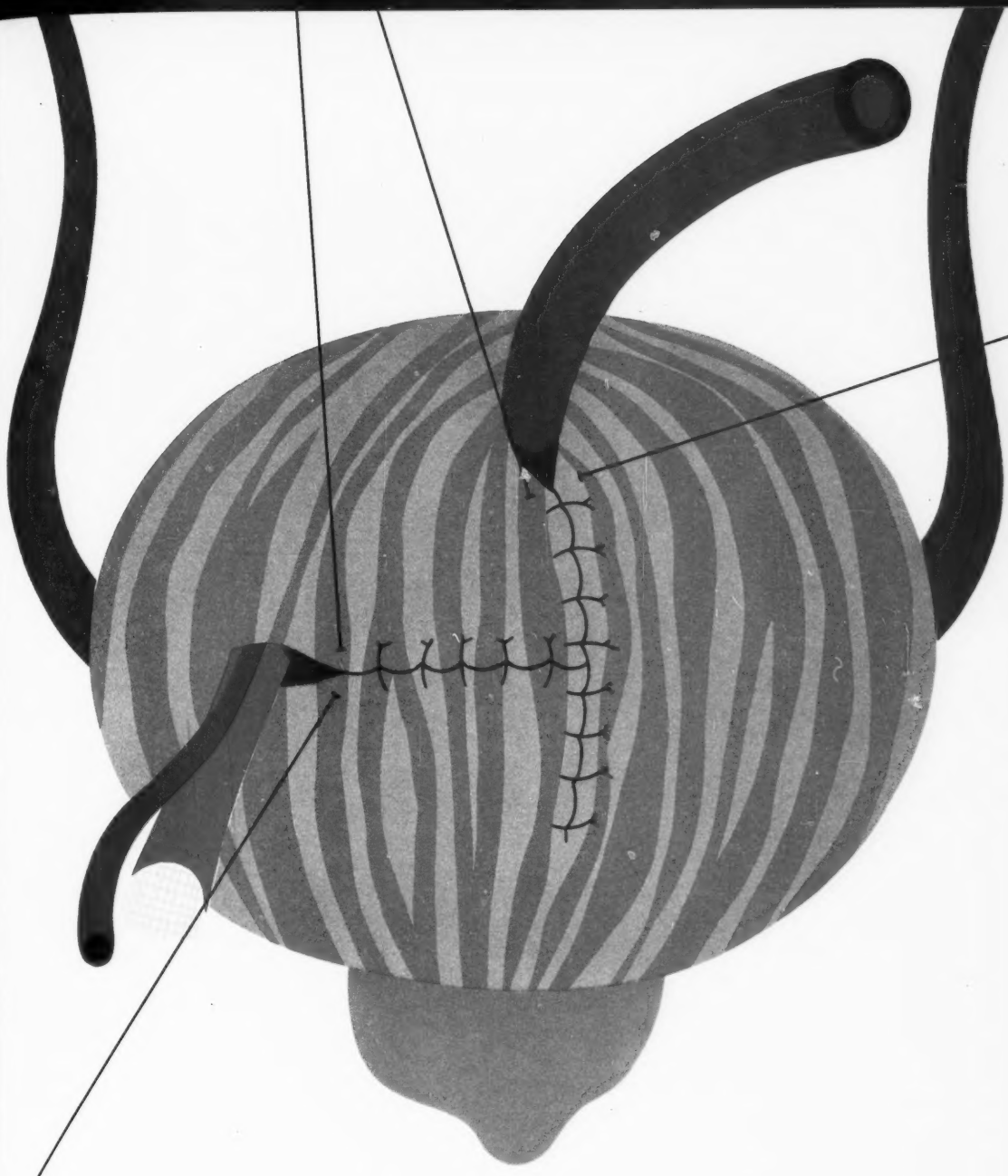

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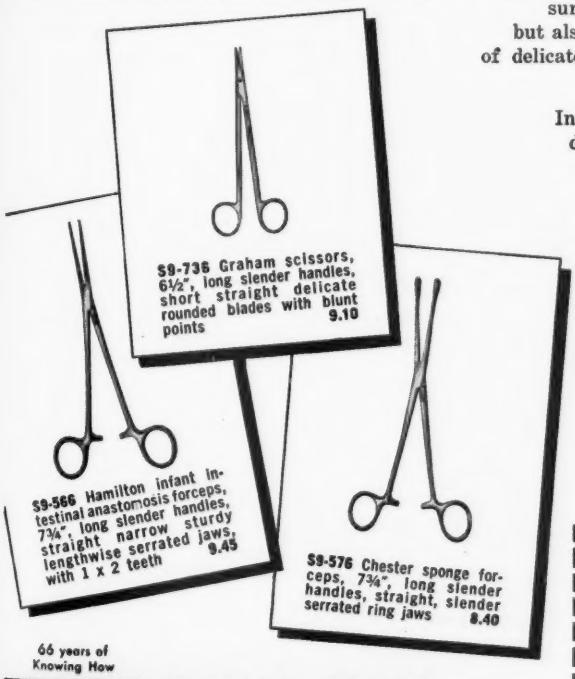

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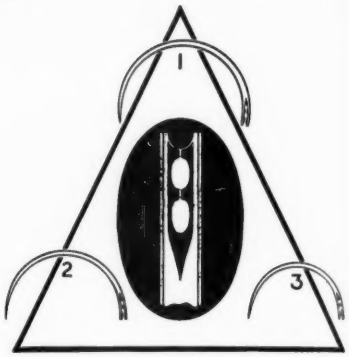

Fig. 6

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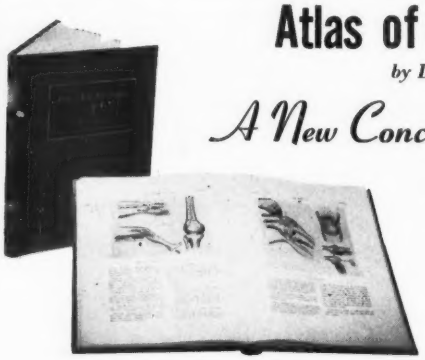

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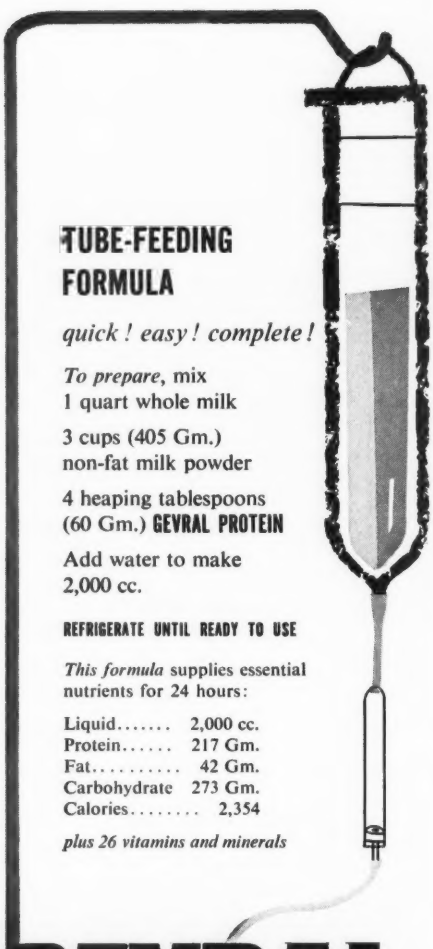

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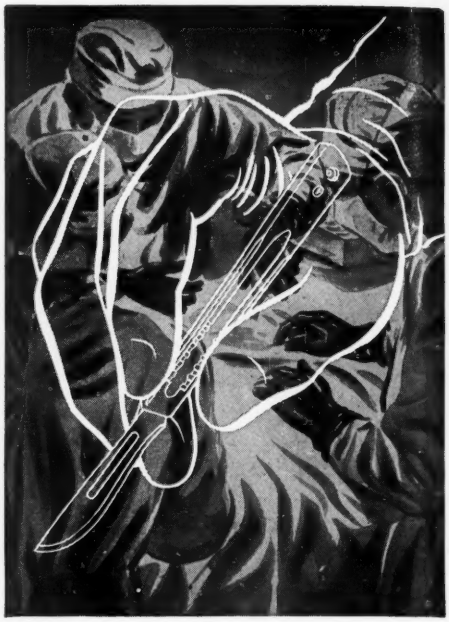

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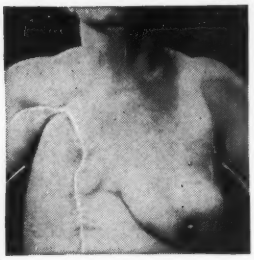

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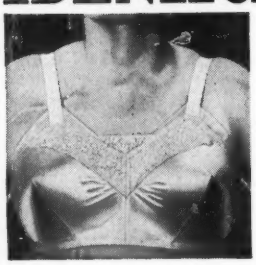

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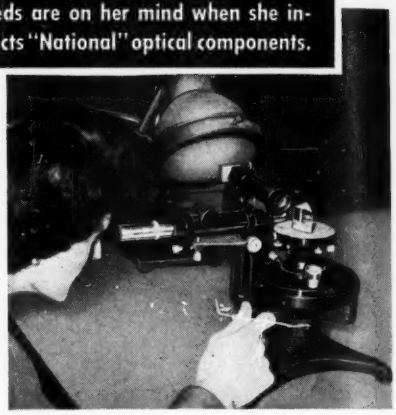

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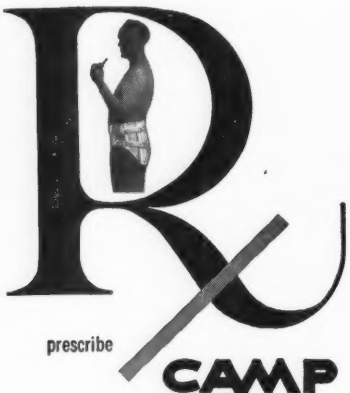

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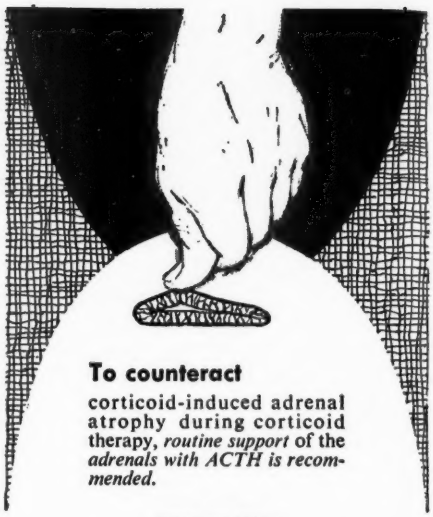

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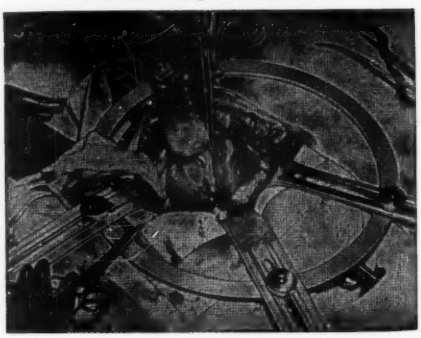

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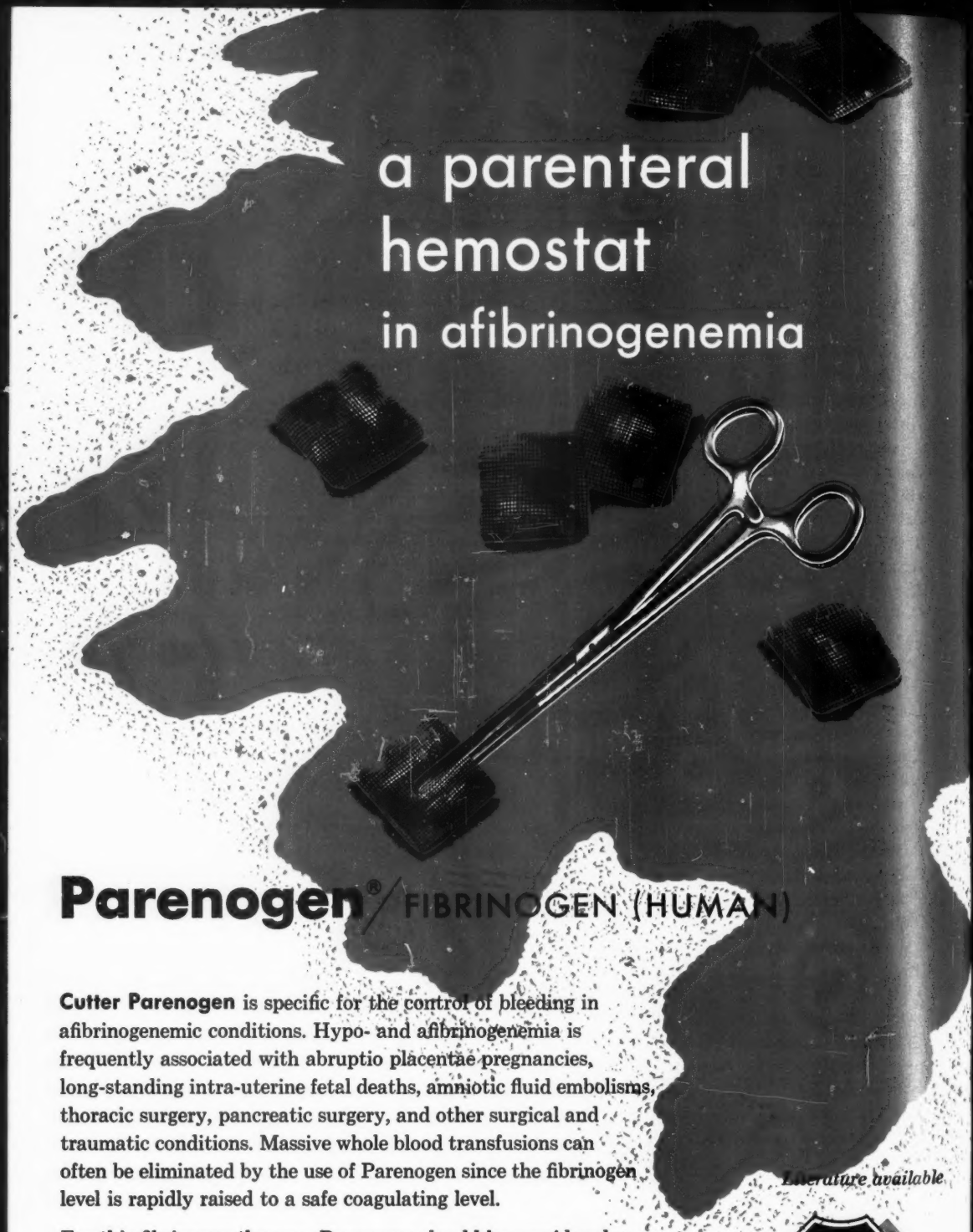

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1. Bonica, J. J.: *Anesthesiology*, 11:716, Nov., 1950.
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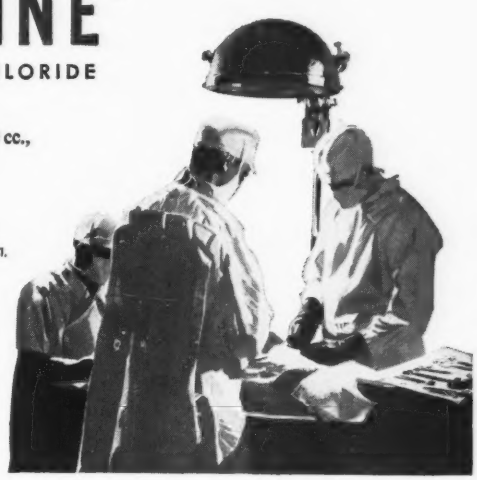

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1. Mathews et al.: Am. Pract. & Dig. Treat. 6:969 (May) 1955.
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